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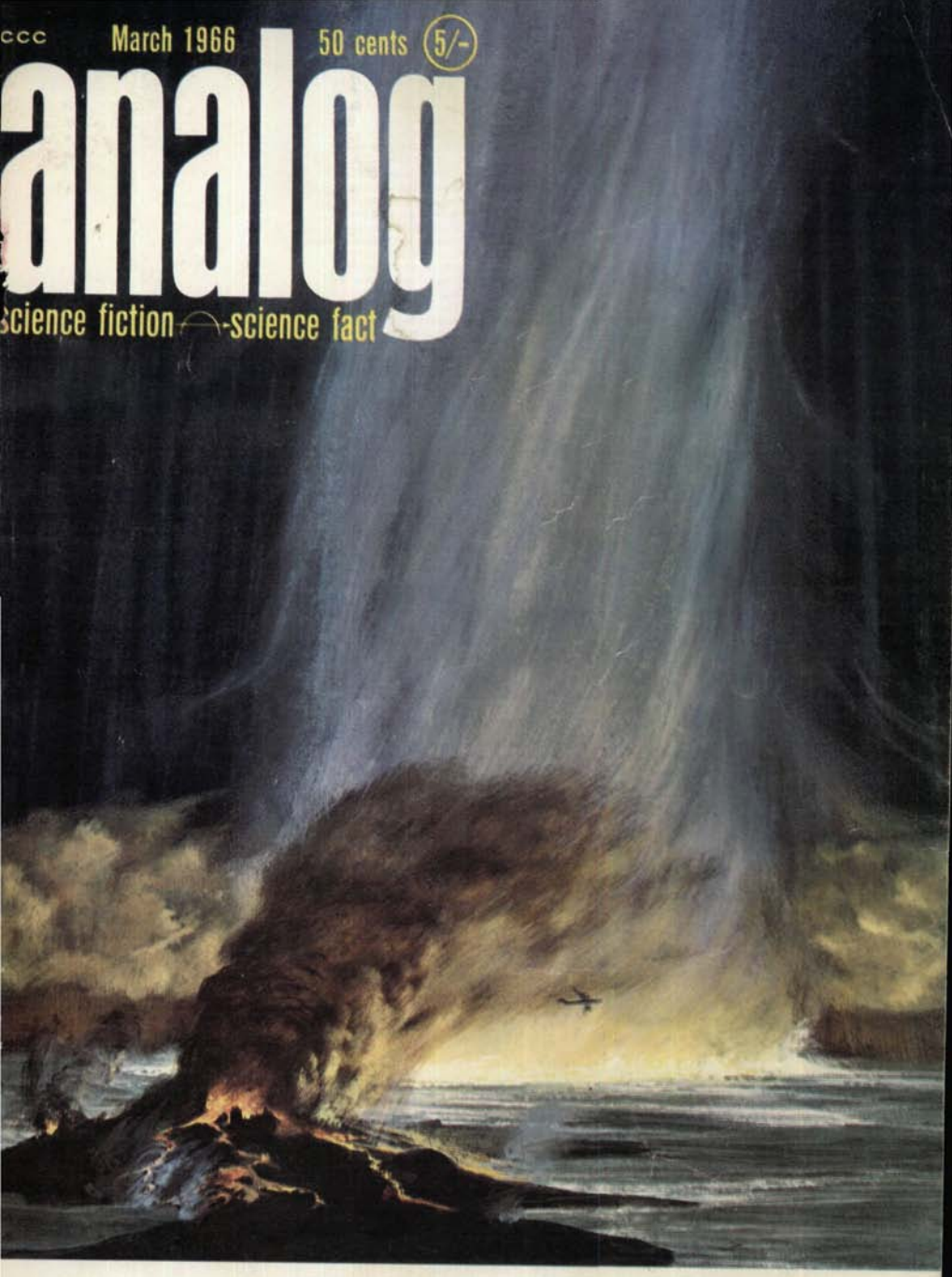

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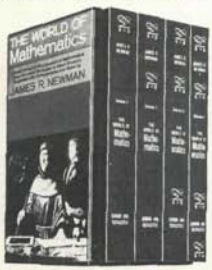

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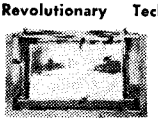

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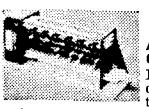

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EDITORIAL BY
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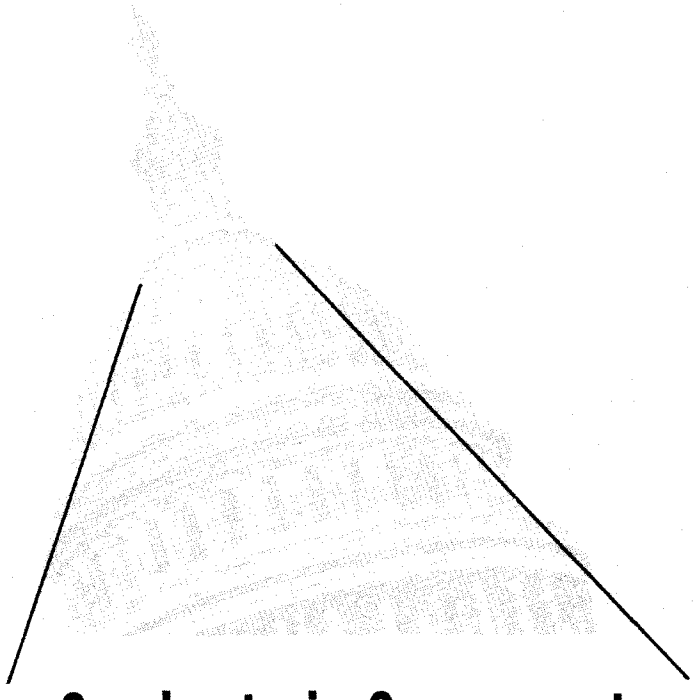

Crackpots in Government

Crackpots, fanatics, and bigots are constantly trying to achieve positions of power where their ideas of How It Should Be can be enforced. Once in a while they make it all the way, and get a chance to impose their beliefs. Hitler—Cromwell—Lenin—a hundred instances in a hundred centuries.

Far less spectacular and more limited in scope is the crackpot who achieves control of a governmental division, a bureau of a bureaucracy, and is able to establish himself long enough to import Right Thinking Friends, and consolidate his True Thoughts as the Established Order.

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Currently, we have one excellent example of that phenomenon of Crackpots in Government—the Food and Drug Administration. For the noblest of self-convinced reasons, the FDA imposes some of the most fantastically irrational rulings. Typically, convinced of their own indubitable rightness and righteousness, they *know* those who question their arbitrary rulings are necessarily doing so for venal reasons. Their enemies *must* be seeking personal gain, and be indifferent to the welfare of the human race.

It's simple logic that if I am honest, pure, nobly motivated, highly trained, and wise, then necessarily those who oppose me *must* be dishonest, crooked, basely motivated, ignorant, and/or foolish. That simple and logical Truth allows the well-meaning fanatic to be sure in his identification of ill-motivated and foolish people. Anyone who opposes his rulings must be ill-motivated or foolish. Q.E.D.

In the case of FDA—rather like the Church Fathers in Galileo's time—practically all people adequately educated and with sufficient knowledge and training to evaluate the problems faced are either employed by or are members of the FDA and its essentially coordinated group, the American Medical Association, or they are employed by organizations wholly dependent on the FDA and AMA for existence—the pharmaceutical manufacturers, food processors, et cetera.

For instance, if a biochemist working for the Brontosauric Drug Company attacks a FDA ruling that the new antibiotic they've developed is ineffective—obviously his disagreement is due solely to his greedy desire for making money, while the pure-and-holy-and-beneficent FDA's motivation can only be For The Public Good. Instead of being judged on the evidence of technical data, the case is judged on the basis of the noble motivations of the FDA vs. the ignoble, profit-making motivations of the manufacturer.

Politically, that's a one hundred per cent sound approach to winning your case. It'll work practically one hundred per cent of the time, when the case is tried in the newspapers—as practically all of the FDA's major cases are. It'll work, in fact, in nearly all cases when the FDA doesn't get its way by merely threatening to try the case in public.

This doesn't mean that the FDA people are wicked, evil, scheming villains—anymore than Pope Urban was a scheming villain in suppressing Galileo. It means that they are completely convinced that they are right-and-righteous, and that that fact makes human beings feel that it is their solemn duty to crush the wicked opposition to their right-and-righteous decision.

In other words, they act precisely like crackpots, bigots and fanatics, in honest certainty that they are infallible.

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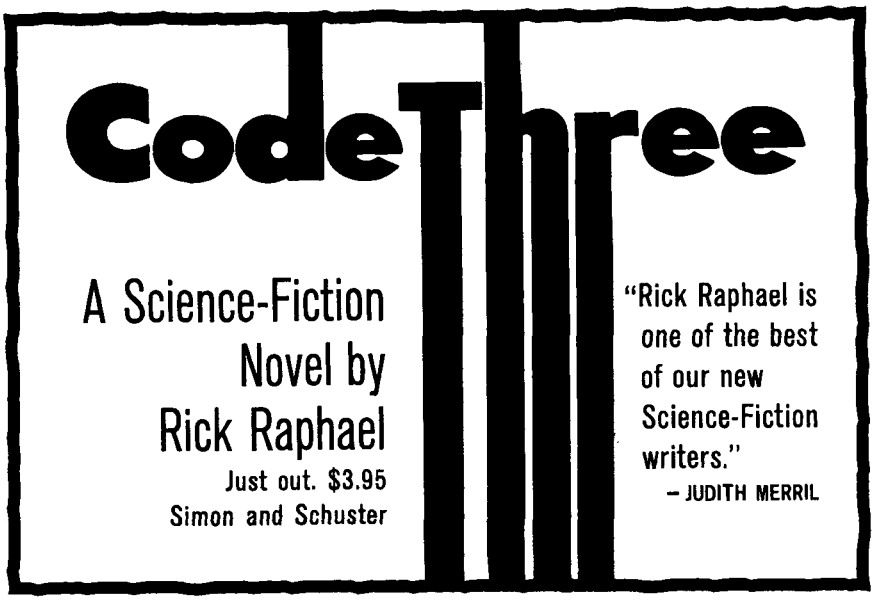
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One example of the irrational behavior of the FDA is the current status of thalidomide.

Thalidomide had one, and only one, known bad side effect; it caused deformation of the foetus in pregnant women under certain special conditions. It required a special condition—a diet deficient in vitamin B complex. The mechanism of the effect is now known. Thousands of women used thalidomide during pregnancy with no ill effects whatever. Those women also were taking vitamin B complex supplements, which neutralized the possible ill effects of thalidomide.

Except for that one side effect—which can be completely negated by simply compounding vitamin B complex in with the thalidomide in tablets—thalidomide is the most effective, and safest, tranquilizer known. It's the only effective tranquilizer known which a disturbed patient *can not* use to commit suicide.

At the time thalidomide was abruptly yanked off the market, some of the *positive* unexpected effects were also beginning to show up. There was evidence, for instance, that it caused some forms of cancer to regress. It definitely was effective in controlling pain in terminal cancer, after morphine was no longer able to block the agony.

Anything that shows even traces of anti-cancer activity obviously

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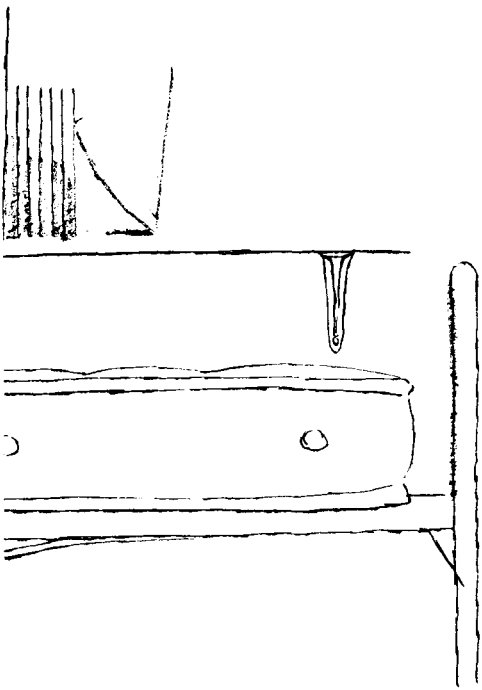

John Schoenherr

They knew what he'd done.

Norman Simmons cringed, his calloused black fingers grasped "Tarzan of the Apes" so tightly that several pages ripped. Seeing what he had done, Norman shut the book and placed it gently on his desk. Then, almost shaking with fear, he tried to roll himself into a ball small enough to escape detection. Gradually he relaxed, panting; Kimball Kinnison would never refuse to face danger. There must be a way out. He knew several routes to the surface. If no one saw him . . .

They'd be hunting for him; and when they caught him, he would die.

He was suddenly anxious to leave the prefab green aluminum walls of his room and school—but what should he take? He pulled the sheet off his bed and spread it on the floor. Norman laid five or six of his favorite books on the sheet, scuttled across the room to his

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closet, pulled out an extra pair of red and orange Bermuda shorts, and tossed them on top of the books. He paused, then added a blanket, his portable typewriter, his notebook, and a pencil. Now he was equipped for any contingency.

Norman wrapped the sheet tightly about his belongings and dragged the makeshift sack to the door. He opened the door a crack, and peeked out. The passageway was empty. He cautiously opened the door wide and stepped down onto the bedrock floor of the tunnel. Then he dragged the sheet and its contents over the doorsill. The bag dropped the ten inches which separated the aluminum floor of his room from the tunnel. The typewriter landed with a muffled clank. Norman glanced anxiously around the corner of the room, up the tunnel. The lights were off in the Little School. It was Saturday and his teachers' day off. The Lab was closed, too, which was unforeseen good luck, since the aloof Dr. Dunbar was usually there at this time.

He warily circled about a nearby transport vehicle. *Model D-49 Ford Cargo Carrier, Army Transport Mark XIXe. Development Contract D-49f1086-1979. First deliveries, January, 1982 . . . RESTRICTED Unauthorized use of RESTRICTED materials is punishable by up to 10 years imprisonment, $10,000 fine, or both: Maintenance Manual: Chapter I, Description . . . The Mark XIXe is a medium speed transport designed to carry loads of less than fifteen tons through constricted areas, such as mine tunnels or storage depots. The "e" modification of the Mark XIX indicates the substitution of a 500-hp Bender fusion power source for the Wankel engine originally intended for use with the XIX. As the Bender pack needs only the natural water vapor in the air for fuel, it is an immense improvement over any other power source. This economy combined with the tape programmed autopilot, make the XIXe one of . . .* Norman shook his head, trying to cut off the endless flow of irrelevant information that came to mind. With practice, he was sure that he would eventually be able to pick out just the data he needed to solve problems, but in the meantime the situation was often very confusing.

The passage he was looking for was between the 345th and 346th fluorescent tube—counting from his room; it was on the left side of the tunnel. Norman began running, at the same time pulling the sack behind him. This was an awkward position for him and he was soon forced to a walk. He concentrated on counting the lighting tubes that were hung from the roof of the tunnel. Each fluorescent cast harsh white light upon the walls of the tunnel, but between the tubes slight shadows lingered. The walls of the passage were streaky with

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whorls almost like wood or marble, but much darker and grayish-green. As he walked a slight draft of fresh air from faraway air regenerators ruffled the hair on his back.

Norman finally turned to face the left wall of the passage and stopped—343-344-345. The liquid streaks of pyrobole and feldspar appeared the same here as in any other section of the tunnel. Taking another step, Norman stood at the darkest point between the two lights. He carefully counted five hand-widths from the point where the wall blended into the floor. At this spot he cupped his hands and shouted into the wall: "Why does the goodwife like Dutch Elm disease for tea?"

The wall replied, "I don't know, I just work here."

Norman searched his memory, looking for one piece of information among the billions. "Well, find out before her husband does."

There was no reply. Instead, a massive section of bedrock swung noiselessly out of the wall, revealing another tunnel at right-angles to Norman's.

He hurried into it, then paused and glanced back. The huge door had already shut. As he continued up the new tunnel, Norman was careful to count the lights. When he came to number 48, he again selected a place on the wall and shouted some opening commands. The new tunnel was slanted steeply upward as were the next three passages which Norman switched to. At last he reached the spot in the sixth tunnel which contained the opening to the surface. He paused, feeling both relief and fear: Relief because there weren't any secret codes and distances to remember after this; fear because he didn't know what or who might be waiting for him on the other side of this last door. What if they were just hiding there to shoot him?

Norman took a deep breath and shouted: "There are only 3,456,628 more shopping days till Christmas."

"So?" came the muffled reply.

Norman thought: *NSA (National Security Agency) cryptographic (code) analysis organization. Report Number 36390.201. MOST SECRET. (Unauthorized use of MOST SECRET materials is punishable by death.): "Mathematical Analysis of Voice and Electronic Pass Codes," by Melvin M. Rosseter, RAND contract 748970-1975. Paragraph 1: Consider L, an m by n matrix (rectangular array —arrangement) of (n times m) elements (items) formed by the Vrevik product . . .* Norman screamed shrilly. In his haste, he had accepted the wrong memories. The torrent of information, cross-references and explanatory notes, was almost as overwhelming as his experience the time he foolishly decided to learn all about plasma physics.

With an effort he choked off the

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memories. But now he was getting desperate. He had to come up with the pass code, and fast.

Finally, "So avoid the mash. Shop December 263."

A large section of the ceiling swung down into the tunnel. Through the opening, Norman could see the sky. But it was gray, not blue like the other time! Norman had not realized that a cloudy day could be so dreary. A cold, humid mist oozed into the tunnel from the opening. He shuddered, but scrambled up the inclined plane which the lowered ceiling section formed. The massive trapdoor shut behind him.

The air seemed still, but so cold and wet. Norman looked around. He was standing atop a large stony bluff. Scrub trees and scraggly brush covered most of the ground, but here and there large sections of greenish, glacier-scoured bedrock were visible. Every surface glistened with a thin layer of water. Norman sneezed. It had been so nice and warm the last time. He peered out over the lower land and saw fog. It was just like the description in the "Adventures of the Two and the Three." The fog hung in the lower land like some tenuous sea, filling rocky fjords in the bluff. Trees and bushes and boulders seemed to lurk mysteriously within it.

This mysterious quality of the landscape gave Norman new spirit. He was a bold adventurer setting out to discover new lands.

He was also a hunted animal.

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Norman found the small footpath he remembered, and set off across the bluff. The wet grass tickled his feet and his hair was already dripping. His books and typewriter were getting an awful beating as he dragged them over the rough ground.

He came to the edge of the bluff. The grass gave way to a bedrock shelf overlooking a drop of some fifty feet. Over the years, winter ice had done its work. Sections of the face of the cliff had broken off. Now the rubble reached halfway up the cliff, almost like a carelessly strewn avalanche of pebbles except that each rock weighed many tons. The fog worked in and out among the boulders and seemed to foam up the side of the cliff.

Norman crept to the edge of the cliff and peered over. Five feet below was a ledge about ten inches wide. The ledge slanted down. At its lower end it was only seven feet above the rocks. He went over, clinging to the cliff with one hand, and grasping the sack which lay on the ground above him with the other. Norman had not realized how slimy the rocks had become in the wet air. His hand slipped and he fell to the ledge below. The sack was jerked over the edge, but he kept his hold on it. The typewriter in the sack hit the side of the cliff with a loud clang.

He collected his wits and crawled to the lower part of the ledge. Here he again went over, but was very careful to keep a firm grip. He let go and landed feet first on a huge boulder directly below. The

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sack crashed down an instant later. Norman clambered over the rocks and soon had descended to level ground.

Nearby objects were obscured by the fog. It was even colder and damper than above. The fog seemed to enter his mouth and nose and draw away his warmth. He paused, then started in the direction that he remembered seeing the airplane hangar last time. Soon he was ankle deep in wet grass.

After about one hundred yards, Norman noticed a darkness to his left. He turned and approached it. Gradually the form of a light plane was defined. Soon he could clearly see the Piper Cub. *Four place, single-jet aircraft; maximum cargo weight, 1200 pounds; minimum runway for takeoff with full load, 90 yards; maximum speed, 250 miles per hour.* Its wings and fuselage shone dully in the weak light. Norman ran up to the Cub, clambered over the struts, and pulled himself into the cabin. He settled his sack in the copilot's seat and slammed the door. The key had been left in the ignition: someone had been extremely careless.

Norman inspected the controls of the little aircraft. Somehow his fear had departed, and specific facts now came easily to mind. He saw that there was an autopilot on the right-hand dash, but it was of a simple-minded variety and could handle only cruising flight.

He reached down and felt the rudder pedals with his feet. By bracing his back against the seat he could touch the pedals and at the same time hold the steering wheel. Of course, he would not be able to see out very easily, but there really wasn't very much *to* see.

He had to get across the border fast and this airplane was probably the only way.

He turned the starter and heard the fuel pumps and turbines begin rotating. Norman looked at the dash. What was he supposed to do next? He pushed the button marked FLASH and was rewarded with a loud *ffumpf* as the jet engine above the wing ignited. He twisted the throttle. The Cub crawled across the field, picking up speed. It bounced and jolted over the turf.

. . . Throttle to full, keeping stick forward . . . until you are well over stall speed (35 miles per hour for a 1980 Cub) . . . pull back gently on the stick, being careful to remain over . . . (35 miles per hour] . . .

He craned his neck, trying to get a view ahead. The ride was becoming smooth. The cub was airborne! Still nothing but fog ahead. For an instant the mist parted, revealing a thirty-foot Security fence barely fifty hards away. He had to have altitude!

. . . Under no circumstances should high angle-of-attack (climb) maneuvers be attempted without sufficient air speed . . .

Instructions are rarely the equal

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of actual experience, and now Norman was going to learn the hard way. He pushed at the throttle and pulled back hard on the stick. The little aircraft nosed sharply upward, its small jet engine screaming. The air speed fell and with it the lifting power of the wings. The Cub seemed to pause for an instant suspended in the air, then fell back. Jet still whining, the nose came down and the plane plunged earthwards.

Imagine a plate of spaghetti—no sauce or meatballs. O.K., now picture an entire room filled with such food. This wormy nightmare gives you some idea of the complexity of the First Security District, otherwise known as the Labyrinth. By analogy each strand of spaghetti is a tunnel segment carved through bedrock. The Labyrinth occupied four cubic miles under the cities of Ishpeming and Negaunee in the Upper Peninsula of Michigan. Without the power of controlled nuclear fusion such a maze could never have been made. Each tunnel was connected to several others by a random system of secret hatches, controlled by voice and electronic codes. Truly the First Security District was the most spy-proof volume in the solar system. The Savannah plant, the CIA, Soviet IKB, and the entire system of GM factories could have co-existed in it without knowledge of each other. As a matter of fact, thirty-one different Security projects, laboratories, and military bases existed in the Labyrinth with their co-ordinates listed in a single filing computer—and there's the rub . . .

"Because he's been getting straight A's," Dr. William Dunbar finished.

Lieutenant General Alvin Pederson, Commander of the First Security District, looked up from the computer console with a harried expression on his face. The two men were alone in the chamber containing the memory bank of United States Government Files Central, usually referred to as Files Central or simply Files. Behind the console were racks of fiber glass, whose orderly columns and rows filled most of the room. At the base of each rack, small lasers emitted modulated and coherent light; as the light passed through the fibers, it was altered and channeled by subtle impurities in the glass. Volume for volume, the computer was ten thousand times better than the best cryogenic models. Files Central contained all the information, secret and otherwise, possessed by the U.S.—including the contents of the Library of Congress, which managed to fill barely ten per cent of Files' capacity. The fact that Pederson kept his office here rather than at Continental Air Defense Headquarters, which occupied another part of the Labyrinth, indicated just how important the functions of Files were.

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Pederson frowned. He had better things to do than listen to every overwrought genius that wanted to talk to him, though Dunbar usually spoke out only when he had something important to say. "You'd better start at the beginning, Doctor."

The mathematician began nervously. "Look. Norman has never had any great interest in his schoolwork. We may have given the chimp high intelligence with this brain-computer combination, but he has the emotional maturity of a nine-year-old human. Norman is bright, curious—and *lazy;* he would rather read science fiction than study history. His schoolwork has always been poorly and incompletely done—until six weeks ago. Since then he has spent virtually no time on real studying. At the same time he has shown a complete mastery of the factual information in his courses. It's almost as if he had an eidetic memory of *facts that were never presented to him.* As if . . ."

Dunbar started on a different tack. "General, you know how much trouble we had co-ordinating the chimp's brain with his computer in the first place. On the one hand you have an African chimpanzee, and on the other an advanced optical computer which theoretically is superior even to Files here. We wanted the chimp's brain to co-operate with the computer as closely as the different parts of a human brain work together. This meant that the computer had to be programmed to operate the way the chimp's mind did. We also had to make time-lapse corrections, because the chimp and the computer are not physically together. All in all, it was a terrifically complicated job. It makes the Economic Planning Programs look like setting up Fox and Geese on a kid's Brain Truster kit." Seeing the other's look of impatience, Dunbar hurried on. "Anyway, you remember that we needed to use the Files computer, just to program *our* computer. And the two machines had to be electronically connected."

The scientist came abruptly to the point, "If by some accident or mechanical failure, the link between Files and Norman *were never cut,* then . . . then the chimp would have complete access to U.S. Files."

Pederson's preoccupation with other matters disappeared. "If that's so, we've got one hell of a problem. And it would explain a lot of other things. Look." He shoved a sheet of paper at Dunbar. "As a matter of routine, Files announces how much information it has supplied to queries during every twenty-four-hour period. Actually it's sort of a slick gimmick to impress visitors with how efficient and useful Files is, supplying information to twenty or thirty different agencies at once. Up until six weeks ago the daily reading hung around ten to the tenth bits per day. During the

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next ten days it climbed to over ten to the twelfth—then to ten to the fourteenth. We couldn't hunt down the source of the queries and most of the techs thought the high readings were due to mechanical error.

"Altogether, Files has supplied almost ten to the fifteenth bits to—someone. And that, Doctor, is equal to the total amount of information contained in Files. It looks as if your monkey has programmed himself with all the information the U.S. possesses."

Pederson turned to the query panel, typed two questions. A tape reel by the desk spun briefly, stopped. Pederson pointed to it. "Those are the co-ordinates of your lab. I'm sending a couple men down to pick up your simian friend. Then I'm sending some more men to wherever his computer is."

Pederson looked at the tape reel expectantly, then noticed the words gleaming on a readout screen above the console:

The co-ordinates you request are not On File.

Pederson lunged forward and typed the question again, carefully. The message on the screen didn't even flicker:

The co-ordinates you request are not On File.

Dunbar leaned over the panel. "It's true, then," he said hoarsely, for the first time believing his fears. "Probably Norman thought we would punish him if we found out he was using Files."

"We would," Pederson interrupted harshly.

"And since Norman could use information On File, he could also *erase* information there. We hardly ever visit the tunnel where his computer was built, so we haven't noticed until now that he had erased its co-ordinates."

Now that he knew an emergency really existed, Dunbar seemed calm. He continued inexorably, "And if Norman was this fearful of discovery, then he probably had Files advise him when you tried to find the location of his computer. My lab is only a couple hundred feet below the surface—and he surely knows how to get out."

The general nodded grimly. "This chimp seems to be one step ahead of us all the way." He switched on a comm, and spoke into it. "Smith, send a couple men over to Dunbar's lab . . . Yeah, I've got the co-ordinates right here." He pressed another switch and the reel of tape spun, transmitting its magnetic impressions to a similar reel at the other end of the hookup. "Have them grab the experimental chimp and bring him down here to Files Central. Don't hurt him, but be careful—you know how bright he is." He cut the circuit and turned back to Dunbar.

"If he's still there, we'll get him; but if he's already made a break for the surface, there's no way we can

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stop him now. This place is just too decentralized." He thought for a second, then turned back to the comm and gave more instructions to his aide.

"I've put in a call to Sawyer AFB to send some airborne infantry over here. Other than that, we can only watch."

A TV panel brightened, revealing a view from one of the hidden surface cameras. The scene was misty, and silent except for an occasional dripping sound.

Several minutes passed; then a superbly camouflaged and counterbalanced piece of bedrock in the center of their view swung down, and a black form in orange Bermuda shorts struggled out of the ground, dragging a large white sack. The chimp shivered, then moved off, disappearing over the crest of the bluff.

Pederson's hands were pale white, clenched in frustration about the arms of his chair. Although the First Security District was built under Ishpeming, its main entrances were fifteen miles away at Sawyer Armed Forces Base. There were only three small and barely accessible entrances in the area where Norman had escaped. Fortunately for the chimpanzee, his quarters had been located near one of them. The area which contained these entrances, belonged to the Ore REclamation Service, a government agency charged with finding more efficient methods of low-grade ore refining. (With the present economic situaton, it was a rather superfluous job since the current problem was to get *rid* of the ore on hand rather than increase production.) All this indirection was designed to hide the location of the First Security District from the enemy. But at the same time it made direct control of the surface difficult.

A shrill sound came from the speaker by the TV panel. Dunbar puzzled, "Sounds almost like a light jet."

Pederson replied, "It probably is. The ORES people maintain a small office up there for appearances' sake, and they have a Piper Cub . . . *Could that chimp fly one?*"

"I doubt it, but I suppose if he were desperate enough he would try anything."

Smith's voice interrupted them, "General, our local infiltration radar has picked up an aircraft at an altitude of fifteen feet. Its present course will take it into the Security fence." The buzzing became louder. "The pilot is going to stall it out! It's in a steep climb . . . eighty feet, one hundred. It's stalled!"

The buzzing whine continued for a second and then abruptly ceased.

The typewriter departed through the front windshield at great speed. Norman Simmons came to in time to see his dog-eared copy of "Ga-

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lactic Patrol" disappear into the murky water below. He made a wild grab for the book, missed it, and received a painful scratch from shards of broken windshield. All that remained of his belongings was the second volume of the Foundation series and the blanket which somehow had been draped half in and half out of the shattered window. The bottom edge of the blanket swung gently back and forth just a couple of inches above the water. The books he could do without; they really had only sentimental value. Since he had learned the Trick, there was no need to physically possess any books. But in the cold weather he was sure to need the blanket; he carefully retrieved it.

Norman pushed open a door, and climbed onto the struts of the Cub for a look around. The plane had crashed nose first into a shallow pond. The jet had been silenced in the impact, and the loudest sound to be heard now was his own breathing. Norman peered into the fog. How far was he from "dry" land? A few yards away he could see swamp vegetation above the still surface of the water; beyond that, nothing but mist. A slight air current eased the gloom. There! For an instant he glimpsed dark trees and brush about thirty yards away.

Thirty yards, through cold and slimy water. Norman's lips curled back in revulsion as he stared at the oily liquid. Maybe there was an aerial route, like Tarzan used. He glanced anxiously up, looking for some overhanging tree branch or vine. No luck. He would have to go *through* the water. Norman almost cried in despair at the thought. Suffocating visions of death by drowning came to mind. He imagined all the creatures with pointy teeth and ferocious appetites that might be lurking in the seemingly placid water: piranhas to strip his bones and—no, they were tropical fish, but something equally deadly. If he could only pretend that it were clear, ankle-deep water.

Dal swam silently toward the moonlit palms and palely gleaming sands just five hundred yards away. Five hundred yards, he thought exultantly, to freedom, to his own kind. The enemy could never penetrate the atoll's camouflage . . . He didn't notice a slight turbulence, the swift emergence of a leathery tentacle from the water. But he fought desperately as he felt it tighten about his leg. Dal's screams were bubbly gurglings inaudible above the faint drone of the surf, as he was hauled effortlessly into the depths and sharp, unseen teeth . . .

For a second his control lapsed, and the fictional incident slipped in. In the comfort of his room, the death of Dal had been no more than the pleasantly chilling end of a villain; here it was almost unbearable. Norman extended one foot gingerly into the water, and quickly drew

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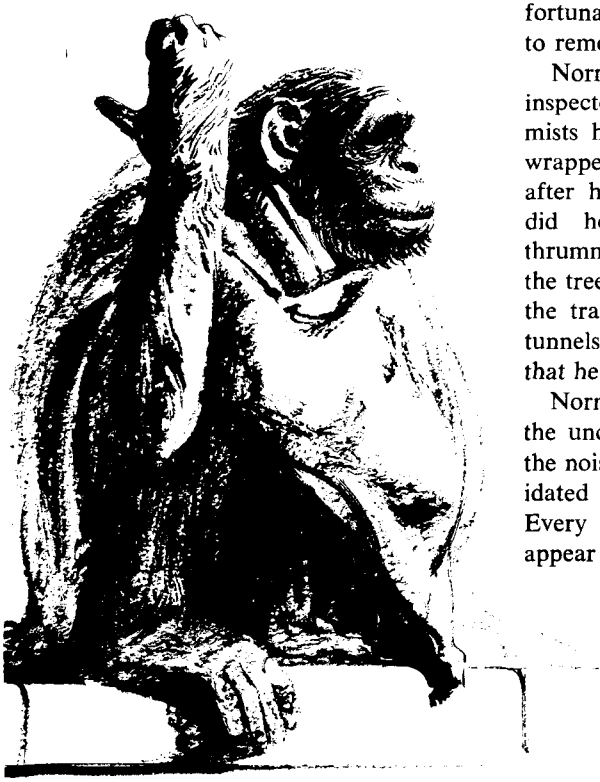
it back. He tried again, this time with both feet. Nothing bit him and he cautiously lowered himself into the clammy water. The swamp weeds brushed gently against his legs. Soon he was holding the strut with one hand and was neck deep in water. The mass of weeds had slowly been compressed as he descended and now just barely supported his weight, even though he had not touched bottom. He released his grip on the strut and began moving toward shore. With one hand he attempted to keep his blanket out of the water while with the other he paddled. Norman glanced about for signs of some hideous tentacle or fin, saw nothing but weeds.



He could see the trees on the shore quite clearly now, and the weeds at his feet seemed backed by solid ground. Just a few more yards—Norman gasped with relief as he struggled out of the water. He noticed an itching on his legs and arms. There had been blood-drinkers in the water after all, but fortunately small ones. He paused to remove the slugs from his body.

Norman sneezed violently and inspected his blanket. Although the mists had made it quite damp, he wrapped it around himself. Only after he was more or less settled did he notice the intermittent thrumming sound coming through the trees on his left. It sounded like the transport vehicles back in the tunnels, or like the automobiles that he had heard and seen on film.

Norman scrambled through the underbrush in the direction of the noises. Soon he came to a dilapidated four-lane asphalt highway. Every minute or so, a car would appear out of the mist, travel

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through his narrow range of vision, and disappear into the mist again.

MOST SECRET (Unauthorized use of MOST SECRET materials is punishable by death.) He had to get to Canada or they would kill him for sure. He knew millions, *billions* of things labled MOST SECRET. Nearly all were unintelligible. The rest were usually boring. A very small percentage were interesting, like something out of an adventure story. And some were horrifying bits of nightmare couched in cold, matter-of-fact words. But all were labeled MOST SECRET, and his access to them was certainly unauthorized. If only he had known beforehand the consequences of Memorizing It All. It had been so easy to do, and so useful, but it was also a deadly, clinging gift.

Now that the airplane had crashed, he had to find some other way to get to Canada. Maybe one of these cars could take him some place where he would have better luck in his attempt. For some reason, the idea didn't trigger warning memories. Blissfully unaware that a talking chimpanzee is not a common sight in the United States, Norman started down the embankment to the shoulder of the highway, and in the immortal tradition of the hitchhiker in "Two for the Road," stuck out his thumb.

Three minutes passed; he clutched the blanket more tightly to himself as his teeth began to chatter. In the distance he heard the thrum of an approaching vehicle. He stared eagerly in the direction of the sound. Within fifteen seconds, a sixty-ton ore carrier emerged from the fog and lumbered toward him. Norman jumped up and down in a frenzy, waving and shouting. The blanket gave him the appearance of a little Amerind doing a particularly violent rain dance. The huge truck rolled by him at about thirty-five miles per hour. Then when it was some forty yards away, the driver slammed on the brakes and the doughy rollagon tires bit into asphalt.

Norman ran joyfully toward the cab, not noticing the uncared-for condition of the starboard ore cranes, the unpainted and dented appearance of the cab, or the wheezy putputting of the Wankel rotary engine—all signs of dilapidation which would have been unthinkable four years before.

He stopped in front of the cab door and was confronted by a pair of cynical, bloodshot eyes peering at him over a three-day growth of beard. "Who . . . Whash are you?" (The condition of the driver would have been unthinkable four years ago, too.)

"My name's Norman—Jones." Norman slyly selected an alias. He resolved to act dull, too, for he knew that most chimps were somewhat stupid, and couldn't speak clearly without the special operations he had had. (In spite of his

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memory and intelligence, Norman had an artificial block against ever completely realizing his uniqueness.) "I want to go to"—he searched his memory—"Marquette."

The driver squinted and moved his head from side to side as if to get a better view of Norman. "Say, you're a monkey."

"No," Norman stated proudly, forgetting his resolution, "I'm a chimpanzee."

"A talkin' monkey," the driver said almost to himself. "You could be worth plen . . . wherezhu say you wanna go . . . Marquette? Sure, hop in. That's where I'm takin' this ore."

Norman clambered up the entrance ladder into the warm cab. "Oh, thanks a lot."

The ore carrier began to pick up speed. The highway had been blasted through greenish bedrock, but it still made turns and had to climb over steep hills.

The driver was expansive, "Can't wait to finish this trip. This here is my las' run, ya know. No more drivin' ore fer the government an' its 'Public Works Projects.' I know where to get a couple black market fusion packs, see? Start my own trucking line. No one'll ever guess where I get my power." He swerved to avoid a natural abutment of greenish rock that appeared out of the mist, and decided that it was time to turn on his fog lights. His mind wandered back to prospects of future success, but along a different line. "Say, you like to talk, Monkey? You could make me a lot of money, ya know: 'Jim Traly an' His Talkin' Monkey.' Sounds good, eh?"

With a start, Norman realized that he was listening to a drunk. The driver's entire demeanor was almost identical to that of the fiend's henchman in "The Mores of the Morgue." Norman had no desire to be a "talkin' monkey" for the likes of Traly, whose picture he now remembered in Social Security Records. The man was listed as an unstable, low competence type who might become violent if frustrated.

As the ore carrier slowed for a particularly sharp turn, Norman decided that he could endure the cold of the outside for a few more minutes. He edged to the door and began to pull at its handle. "I think I better get off now, Mr. Traly."

The ore carrier slowed still more as the driver lunged across the seat and grabbed Norman by one of the purple suspenders that kept his orange Bermuda shorts up. A full grown chimpanzee is a match for most men, but the driver weighed nearly three hundred pounds and Norman was scared stiff. "You're shtaying right here, see?" Traly shouted into Norman's face, almost suffocating the chimpanzee in alcohol vapor. The driver transferred his grip to the scruff of Norman's neck as he accelerated the carrier back to cruising speed.

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"Crashed in a shallow swamp just beyond the Security fence, sir." The young Army captain held a book up to the viewer. "This copy of Asimov was all that was left in the cabin, but we dredged up some other books and a typewriter from the water. It's only about five feet deep there."

"But where did the chim . . . the pilot go?" Pederson asked.

"The pilot, sir?" The captain knew what the quarry was but was following the general's line. "We have a man here from Special Forces who's a tracker, sir. He says that the pilot left the Cub and waded ashore. From there, he tracked him through the brush to the old Ishpeming-Marquette road. He's pretty sure that the . . . um . . . pilot hitched a ride in the direction of Marquette." The captain did not mention how surprised the lieutenant from Special Forces had been by the pilot's tracks. "He probably left the area about half an hour ago, sir."

"Very well, Captain. Set up a guard around the plane; if anyone gets nosy, tell them that ORES has asked you to salvage their crashed Cub. Fly everything you found in the cabin and swamp back to Sawyer and have it sent down here to Files Central."

"Yes, sir."

Pederson cut the connection and began issuing detailed instructions to his chief aide over another circuit. Finally he turned back to Dunbar. "That chimp is not going to remain one step ahead of us for very much longer. I've alerted all the armed forces in the Upper Peninsula to start a search, with special concentration on Marquette. It's lucky that we have permission to conduct limited maneuvers there or I might have an awful time just getting permission to station airbornes over the city.

"And now we can take a little time to consider ways of catching this Norman Simmons, rather than responding spastically to *his* initiative."

Dunbar said quickly, "In the first place, you can cut whatever connection there is between Files and Norman's computer."

Pederson grinned. "Good enough. That was mixed in with the rest of the instructions I've given Smith. If I remember right, the two computers were connected by a simple copper cable, part of the general cable net that was installed interweaving with the tunnel system. It should be a simple matter to cut the circuit where the cable enters the Files room."

The general thought for a moment. "The object now is to catch the chimp, discover the location of the chimp's computer, or both. Down here we can't do anything directly about the chimp. But the computer has to be in contact with Norman Simmons. Could we trace these emanations?"

Dunbar blinked. "You know that

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better than I, General. The Signal Corps used our experiment to try a *quote* entirely new concept in communications *unquote*. They supplied all the comm equipment, even the surgical imbeds for Norman. And they are playing it pretty cozy with the technique. Whatever it is, it goes through almost anything, does not travel faster than light, and can handle several billion bits per second. It might even be ESP, if what I've read about telepathy is true."

Pederson looked sheepish. "I do recognize the 'new concept' you mention. I just never connected the neutri . . . this technique with your project. But I should have known; we have only one way to broadcast through solid rock as if it were vacuum. Unfortunately, with the devices we have now, there's no way of getting a directional bearing on such transmissions. With enough time and as a last resort we might be able to jam them, though."

Now it was Dunbar's turn to make a foolish suggestion. "Maybe if a thorough search of the tunnels were made, we could find the—"

Pederson grimaced. "Bill, you've been here almost three years. Haven't you realized how complicated the Labyrinth is? The maze is composed of thousands of tunnel segments spread through several cubic miles of bedrock. It's simply too complex for a blind search—and there's only one set of blueprints," he jerked a thumb at the racks of fiber glass. "Even for routine trips, we have to make out tapes to plug into the transport cars down there. If we hadn't put his quarters close to ground level, so you could take him for walks on the surface, Norman would still be wandering around the Labyrinth, even though he knows what passages to take.

"About twice a day I ride over to Continental Air Defense Headquarters. It takes about half an hour and the trip is more tortuous then a swoopride at a carnival. CAD HQ could be just a hundred yards from where we're sitting, or it could be two miles—in any direction. For that matter, I don't really know where *we* are right now. But then," he added with a sly smile, "neither do the Russki or Han missilemen. I'm sorry, Doctor, but it would take years of random searching to find the computer."

And Dunbar realized that he was right. It was general policy in the First Security District to disperse experiments and other installations as far as possible through the tunnel maze. So it had been with Norman's computer. With its own power source the computer needed no outside assistance to function.

The scientist remembered its strange appearance, resting like a huge jewel in a vacant tunnel—where? It was a far different sight from the appearance of Files. Norman's computer had the facets of a cut gem, although this had been a

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functional rather than an aesthetic necessity. Dunbar remembered the multicolor glows that appeared near its surface; further in, the infinite reflections and subtle refractions of microcomponent flaws in the glass blended into a mysterious flickering, hinting at the cheerful though immature intelligence that was Norman Simmons. This was the object which had to be found.

Dunbar broke out of his reverie. He started on a different tack. "Really, General, I don't quite see how this situation can be quite as desperate as you say. Norman isn't going to sell secrets to the Reds; he's as loyal as a human child could be—which is a good deal more than most adults, because he can't rationalize disloyalty so easily. Besides, you know that we were eventually going to provide him with large masses of data, anyway. The goal of this whole project is to test the possibility of giving humans an encyclopedic mental grasp. He just saw how much the information could help him, and how much easier it could be obtained than by study, and he pushed the experiment into its next phase. He shouldn't be punished or hurt because of that. This situation is really no one's fault."

Pederson snapped back, "Of course, it's no one's fault; that's just the hell of it. When no one is to blame for something, it means that the situation is fundamentally beyond human control. To me, your whole project is taking control away from people and giving it to *others.* Here an experimental animal, a chimpanzee, has taken the initiative away from the U.S. Government—don't laugh, or so help me—" The general made a warning gesture. "Your chimp is more than a co-ordinator of information; he's also *smarter* than he was before. *What're the humans we try this on going to be like?"*

Pederson calmed himself with a deliberate effort. "Never mind that now. The important thing is to find Simmons, since he appears to be the only one who," Pederson groaned, "knows where his brains are. So let's get practical. Just what can we expect from him? How easy is it for him to correlate information in his memory?"

Dunbar considered. "I guess the closest analogy between his mind and a normal one is to say that he has an eidetic memory—and a *very* large one. I imagine that when he first began using the information he was just swamped with data. Everything he saw stimulated a deluge of related memories. As his subconscious became practiced, he probably remembered only information that was pertinent to a problem. Say that he saw a car, and wondered what year and make it was. His subconscious would hunt through his copy of Files—at very high speed—and within a tenth of a second Norman would 'remem-

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ber' the information he had just wondered about.

"However, if for some reason he suddenly wondered what differential equations were, it would be a different matter, because he couldn't *understand* the information presented, and so would have to wade through the same preliminary material that every child must in order to arrive at high-school math. But he could do it very much faster, because of the ease with which he could pick different explanations from different texts. I imagine he could get well into calculus from where he is now in algebra with a couple hours of study."

"In other words, the longer he has this information, the more dangerous he'll be."

"Uh, yes. However, there *are* a couple things on our side. First, it's mighty cold and damp on the surface, for Norman at least. He is likely to be very sick in a few hours. Second, if he travels far enough away from the First Security District, he will become mentally disoriented. Although Norman doesn't know it—unless he has specifically considered the question—he could never get much farther than fifteen miles away and remain sane. Norman's mind is a very delicate balance between his organic brain and the hidden computer. The co-ordination is just as subtle as that of different nerve paths in the human brain. The information link between the two has to transmit more than a billion bits of information per second. If Norman gets beyond a certain point, the time lapse involved in transmission between him and the computer will upset the co-ordination. It's something like talking by radio with a spacecraft; beyond a certain distance it is difficult or impossible to maintain a meaningful conversation. When Norman goes beyond a certain point it will be impossible for him to think coherently."

Dunbar was struck by an unrelated idea. He added, "Say, I can see one reason why this could get sticky. What if Norman got picked up by foreign agents? That would be the biggest espionage coup in the history of man."

Pederson smiled briefly. "Ah, the light dawns. Yes, some of the information this Simmons has could mean the death of almost everyone on Earth, if it were known to the wrong people. Other secrets would *merely* destroy the United States.

"Fortunately, we're fairly sure that the Reds' domestic collapse has reduced their overseas enterprises to about nil. As I remember it, there are only one or two agents in all of Michigan. Thank God for small favors."

Boris Kuchenko scratched and was miserable. A few minutes before, he had been happily looking forward to receiving his weekly unemployment check and then spending the afternoon clipping ar-

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ticles out of the *NATO Armed Forces Digest* for transmission back to Moscow. And now this old coot with his imperious manner was trying to upset everything. Kuchenko turned to his antagonist and tried to put on a brave front. "I am sorry, Comrade, but I have my orders. As the ranking Soviet agent in the Upper Peninsu—"

The other snapped back, "Ranking agent, nothing! You were never supposed to know this, Kuchenko, but you are a cipher, a stupid dummy used to convince U.S. Intelligence that the USSR has given up massive espionage. If only I had some decent agents here in Marquette, I wouldn't have to use idiots like you."

Ivan Sliv was an honest-to-God, effective Russian spy. Behind his inconspicuous middle-aged face, lurked a subtle mind. Sliv spoke five languages and had an excellent grasp of engineering, mathematics, geography, and history—*real* history, not State-sponsored fairy tales. He could make brilliantly persuasive conversation at a cocktail party or commit a political murder with equal facility. Sliv was the one really in charge of espionage in the militarily sensitive U.P. area. He and other equally talented agents concentrated on collecting information from Sawyer AFB and from the elusive First Security District.

The introduction of Bender's fusion pack had produced world-wide depression, and the bureaucracies of Russia had responded to this challenge with all the resiliency of a waterlogged pretzel. The Soviet economic collapse had been worse than that of any other major country. While the U.S. was virtually recovered from the economic depression caused by the availability of unlimited power, counter-revolutionary armies were approaching Moscow from the West *and* the East. Only five or ten ICBM bases remained in Party hands. But the Comrades had been smart in one respect. If you can't win by brute force, it is better to be subtle. Thus the planetary spy operations were stepped up, as was a very secret project housed in a system of caves under the Urals. Sliv's mind shied away from that project—he was one of the few to know of it, and that knowledge must never be hinted at.

Sliv glared at Kuchenko. "Listen, you fat slob: I'm going to explain things once more, if possible in words of one syllable. I just got news from Sawyer that some Amie superproject has backfired. An experimental animal has escaped from their tunnel network and half the soldiers in the U.P. are searching for it. They think it's here in Marquette."

Kuchenko paled, "A war virus test? Comrade, this could be—" the fat Soviet agent boggled at the possibilities.

Sliv swore. "No, no, no! The Army's orders are to *capture,* not

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destroy the thing. We are the only agents that are in Marquette now, or have a chance to get in past the cordon that's sure to be dropped around the city. We'll split up and—" He stopped and took conscious notice of the buzzing sound that had been building up over the last several minutes. He walked quickly across the small room and pushed open a badly cracked window. Cold air seemed to ooze into the room. Below, the lake waters splashed against the pilings of the huge automated pier which incidentally contained this apartment. Sliv pointed into the sky and snapped at the bedraggled Kuchenko, "See? The Amie airbornes have been over the city for the last five minutes, at least. We've got to get going, man!"

But Boris Kuchenko was a man who liked his security. He miserably inspected his dirty fingernails, and began, "I really don't know if this is the right thing, Comrade. We—"

The fog had disappeared, only to be replaced by a cold drizzle. Jim Traly guided the ore carrier through Marquette to the waterfront. Even though drunk, he maintained a firm grip on Norman's neck. The carrier turned onto another street, and Norman got his first look at Lake Superior. It was so gray and cold; beyond the breakwater the lake seemed to blend with the sullen hue of the sky. The carrier turned again. They were now moving parallel to the water along a row of loading piers. In spite of the rollagons, the carrier dipped and sagged as they drove over large potholes in the substandard paving material. The rain had collected in these depressions and splashed as they drove along. Traly apparently recognized his destination. He slowed the carrier and moved it to the side of the street.

Traly opened his door and stepped down, dragging Norman behind him. With difficulty the chimpanzee kept his balance and did not land on his head. The drunk driver was muttering to himself, "Las' time I drive this trash. They can pick up the inventories themselves. Good riddance." He kicked a rollagon. "Just wait till I get some Bender fusion packs. I'll show 'em. C'mon, you." He gave Norman a jerk, and began walking across the street.

The waterfront was almost deserted. Traly was heading for what appeared to be the only operating establishment in the area: a tavern. The bar had a rundown appearance. The "aluminum" trim around the door had long since begun to rust, and the memory cell for the bar's sky sign suffered from amnesia so that it now projected into the air:

The D-unk PuT pavern

Traly entered the bar, pulling Norman in close behind. Once the fluorescents had probably lighted the place well, but now only two or three in a far corner were operating.

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He pulled Norman around in front of him and seemed eager to announce his discovery of the "talkin' monkey." Then he noticed that the bar was almost empty. No one was sitting at any of the tables, although there were half empty glasses of beer left on a few of them. Four or five men and the barkeeper were engaged in an intense discussion at the far end of the room. "Where is everybody?" Traly was astonished.

The barkeeper looked up. "Jimmy! Right at lunch President Langley came on TV an' said that the government was going to let us buy as many Bender fusion boxes as we want. You could go out an' buy one right now for twenty-five bucks. When everybody heard that, why they just asked themselves what they were doin' sittin' around in a bar when they could have a job an' even be in business for themselves. Not much profit for me this afternoon, but I don't care. I know where I can get some junk copters. Fit 'em out with Bender packs and start a tourist service. You know: See the U.P. with Don Zalevsky." The bartender winked.

Traly's jaw dropped. He forgot Norman. "You really mean that there's no more black market where we can get fusion boxes?"

One of the customers, a short man with a protuberant beak and a bald pate, turned to Traly. "What do you need a black market for when you can go out an' buy a Pack for twenty-five dollars? Well, will you look at that: Traly's disappointed. Now you can do whatcher always bragging about, go out and dig up some fusion boxes and go into business." He turned back to the others.

"And we owe it all to President Langley's fizical and economic policies. Bender's Pack coulda destroyed our nation. Instead we only had a little depression, an' look at us now. Three years after the invention, the economy's on an even keel enough to let us buy as many power packs as we want."

Someone interrupted, "You got rocks in your head, buddy. The government closed down most of the mines so the oil corporations would have a market to make plastics for; we get to produce just enough ore up here so no one starves. Those 'economic measures' have kept us all hungry. If the government had only let us buy as many Packs as we wanted and not interfered with free competition, there wouldna been no depression or nothing."

From the derisive remarks of the other customers, this appeared to be a minority opinion. The Beak slammed his glass of beer down and turned to his opponent. "You know what woulda happened if there wasn't no 'interference'?" He didn't wait for an answer. "Everybody woulda gone out an bought Packs. All the businesses in the U.S. woulda gone bankrupt, 'cause anyone with a Bender and some elec-

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tric motors would hardly need to buy any regular goods, except food. It wouldn't have been a depression, it woulda been just like a jungle. As it is, we only had a short period of adjustment," he almost seemed to be quoting, "an' now we're back on our feet. We got power to burn; those ore buckets out in the bay can fly through the air and space, and we can take the salt out of the water and—"

"Aw, you're jus' repeating what Langley said in his speech."

"Sure I am, but it's true." Another thought occurred to him. "And *now* we don't even need Public Works Projects."

"Yeah, no more Public Works Projects," Traly put in, disappointed.

"There wouldn't have been no need for PWP if it wasn't for Langley and his loony ideas. My old man said the same thing about Roosevelt." The dissenter was outnumbered but voluble.

Norman had become engrossed in the argument. In fact he was so interested that he had forgotten his danger. Back in the District he had been made to learn some economics as part of his regular course of study—and, of course, he could remember considerably more about the subject. Now he decided to make his contribution. Traly had loosened his grip; the chimpanzee easily broke the hold and jumped to the top of the counter. "This man," he pointed to the Beak, "is right, you know. The Administration's automatic stabilizers and discretionary measures prevented total catastro—"

"What is *this*, Jimmy?" The bartender broke the amazed silence that greeted Norman's sudden action.

"That's what I've been trying to tell you guys. I picked up this monkey back in Ishpeming. He's like a parrot, only better. Jus' listen to him. I figure he could be worth a lot of money."

"Thought you were going into the trucking business, Jimmy."

Traly shrugged, "This could be a lot greener."

"That's no parrot-talk," the Beak opined. "The monkey's *really* talking. He's smart like you and me."

Norman decided that he had to trust someone. "Yes I am, yes I am! And I need to get into Canada. Otherwise—"

The door to the Drunk Pup Tavern squeaked as a young man in brown working clothes pushed it halfway open. "Hey, Ed, all of you guys. There's a bunch of big Army copters circling the bay, and GI's all over. It doesn't look like any practice maneuver." The man was panting as if he had run several blocks.

"Say, let's see that," moved the Beak. He was informally seconded. Even the bartender seemed ready to leave. Norman started. *They* were still after him, and they were

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close. He leaped off the counter and ran through the half-open door, right by the knees of the young man who had made the announcement. The man stared at the chimpanzee and made a reflex grab for him. Norman evaded the snatch and scuttled down the street. Behind him, he heard Traly arguing with the man about, "Letting my talking monkey escape."

He had dropped his blanket when he jumped onto the counter. Now the chill drizzle made him regret the loss. Soon he was damp to the skin again, and the water splashed his forearms and legs as he ran through spots where water had collected in the tilted and cracked sections of sidewalk. All the shops and dives along the street were closed and boarded up. Some owners had left in such disgust and discouragement that they had not bothered even to pull in their awnings. He stopped under one such to catch his breath and get out of the rain.

Norman glanced about for some sign of airborne infantrymen, but as far as he could see, the sky was empty of men and aircraft. He examined the awning above him. For several years the once green plastic fabric had been subjected alternately to baking sun and rotting rain. It was cheap plastic and now it hung limp, the gray sky visible through the large holes in the material. Norman looked up, got an idea. He backed away from the awning and then ran toward it. He leaped and caught its rusting metal frame. The shade sagged even more, but held. He eased himself over the frame and rested for an instant on the top; then pulled himself onto the windowsill of a second-story apartment.

Norman looked in, saw nothing but an old bed and a closet with one lonely hanger. He caught the casing above the window and swung up. It was almost like being Tarzan. (Usually, Norman tended to identify himself with Tarzan rather than with the Lord-of-the-Jungle's chimpanzee flunkies.) He caught the casing with his toes, pushed himself upwards until he could grasp the edge of the flat roof. One last heave and he was lying on the tar-and-gravel roofing material. In places where the tar had been worn away, someone had sprayed plastite, but more time had passed and that "miracle construction material" had deteriorated, too.

The roofs provided scant cover from observation. Fifty feet away, Norman saw the spidery black framework of a radio tower mounted on the roof of another building. It was in good repair; probably it was a government navigation beacon. Norman sneezed several times, violently. He crawled warily across the roof toward the tower. The buildings were separated by a two-foot alley which Norman easily swung across.

He arrived at the base of the tower. Its black plastic members

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gleamed waxily in the dull light. As with many structures built after 1980, Hydrocarbon Products Administration regulations dictated that it be constructed with materials deriving from the crippled petroleum and coal industries, Norman remembered. In any case, the intricate framework provided good camouflage. Norman settled himself among the girders and peered out across Marquette.

There were hundreds of them! In the distance, tiny figures in Allservice green were walking through the streets, inspecting each building. Troop carriers and airtanks hung above them. Other airtanks patrolled some arbitrary perimeter about the city and bay. Norman recognized the setup as one of the standard formations for encirclement and detection of hostile forces. With confident foreknowledge he looked up and examined the sky above him. Every few seconds a buckrogers fell out of the apparently empty grayness. After a free fall of five thousand feet, the airborne infantrymen hit their jets just two or three hundred feet above the city. Already, more than twenty of them were posted over the various intersections.

The chimpanzee squinted, trying to get a clearer view of the nearest buckrogers. Images seen through the air behind and below the soldier seemed to waver. This and a faint screaming sound was the only indication of the superheated air shot from the Bender powered thermal element in the soldier's back pack. The infantryman's shoulders seemed lopsided. On more careful inspection Norman recognized that this was due to a GE fifty-thousand line reconnaissance camera strapped to the soldier's upper arm and shoulder. The camera's eight-inch lens gaped blackly as the soldier turned (rotated?) in the chimp's direction.

Norman froze. He knew that every hyper-resolution picture was being transmitted back to Sawyer AFB where computers and photo-interp teams analyzed them. Under certain conditions just a clear footprint or the beady glint of Norman's eyes within the maze of girders would be enough to bring a most decisive—though somewhat delayed—reaction.

As the buckrogers turned away, Norman sighed with relief. But he knew that he wouldn't remain safe for long. Sooner or later—most likely sooner—they would be able to trace him. And then . . . With horror he remembered once again some of the terrible bits of information that hid in the vast pile he knew, remembered the punishments for unauthorized knowledge. *He had to escape them!* Norman considered the means, both fictional and otherwise, that had been used in the past to elude pursuers. In the first place, he recognized that some outside help was needed, or

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he could never escape from the country. Erik Satanssen, he remembered, always played the double agent, gaining advantages from both sides right up to the denouement. Or take Slippery Jim DiGriz . . . the point was there are always some loopholes even in the most mechanized of traps. What organization would have a secret means of getting across Lake Superior into Canada? The Reds, of course!

Norman stopped fiddling with his soaked suspenders, and looked up. That was the pat answer, in some stories: Pretend to side up with the baddies just long enough to get out of danger and expose them at the same time. Turning around, he gazed at the massive automated pier jutting out into the bay. At its root were several fourth-class apartments—and in one of them was the only Soviet agent in the Upper Peninsula! Norman remembered more about Boris Kuchenko. What sort of government would employ a slob like that as a spy? He racked his memory but could find no other evidence of espionage in the U.P. area.

Many tiny details seemed to crystallize into an idea. It was just like in some stories where the hero appears to pull his hunches out of the thin air. Norman *knew* without any specific reason, that the Soviets were not as incapacitated as they seemed. Stark, Borovsky, Ivanov were smart boys, much smarter than the so-called Bumpkinov incompetents they had replaced. If Stark had been in power in the first place, the Soviet Union might have survived Bender's invention without losing more than a few outlying SSR's. As it was the Party bosses controlled only the area immediately around Moscow and some "hardened" bases in the Urals. Somehow Norman felt that, if all the mental and physical resources of the rulers had been used against the counter-revolutionaries, the Reds' position would have to be better. Borovsky and Ivanov especially, were noted for devious, back-door victories. Something smelled about this spy business.

If Kuchenko was more than he seemed, there might be a way out even yet. If he could trick the Reds into thinking he was a stupe or a traitor, they might take him to some hideout in Canada. He knew they would be interested in him and his knowledge; that was his passport and his peril. They must never know the things *he* knew. And then later, in Canada, maybe he could expose the Russian spies and gain forgiveness.

The nearest buckrogers was now facing directly away from Norman's tower. The chimpanzee moved away from the tower, hurried to the edge of the roof, and swung himself over. Now he was out of the line of sight of the infantryman. He reached the ground and scampered across the empty

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street. Soon he was padding along the base of the huge auto pier. Finally he reached the point where the street was swallowed by the enclosed portion of the pier. Norman ran into the dimness; at least he was out of the rain now. Along the side of the inner wall was a metal grid stairway. The chimp clambered up the stairs, found himself in the narrow corridor serving the cheap apartments which occupied what otherwise would have been dead space in the warehouse pier. He paused before turning the doorknob.

". . . Move fast!" The knob was snatched from his fingers, as someone on the other side pulled the door open. Norman all but fell into the room. "What the hell!" The speaker slammed the door shut behind the chimpanzee. Norman glanced about the room, saw Boris Kuchenko frozen in the act of wringing his hands. The other man spun Norman around, and the chimpanzee recognized him as one Ian Sloane, civilian employee No. 36902u at Sawyer AFB; so the hunch had been right! The Reds *were* operating on a larger scale than the government suspected.

Norman assumed his best conspiratorial air. "Good morning, gentlemen . . . or should I say Comrades?"

The older man, Sloane, kept a tight grip on his arm. A look of surprise and triumph and oddly—fear, was on his face. Norman decided to go all the way with the double-agent line. "I'm here to offer my services, uh, Comrades. Perhaps you don't know quite what and who I am . . ." He looked around expectantly for some sign of curiosity. Sloane—that was the only name Norman could remember, but it couldn't be his real one—gazed at him attentively, but kept a tight grip on his arm. Seeing that he was going to get no response, Norman continued less confidently. "I . . . I know who you are. Get me out of the country and you'll never regret it. You must have some way of escaping—at the very least some hiding place." He noticed Boris Kuchenko glance involuntarily at a spot in the ceiling near one of the walls. There was an ill-concealed trap hacked raggedly out of the ceiling. It hardly seemed the work of a master spy.

At last Sloane spoke. "I think we can arrange your escape. And I am sure that we will not regret it."

His tone made Norman realize how naïve his plan had been. These agents would get the information and secrets from him or they would destroy him, and there was no real possibility that he would have any opportunity to create a third, more acceptable alternative. The fire was much hotter than the frying pan, and fiction was vaporized by reality. He was in trouble.

Pfft.

The tiny sound came simultaneously with a pinprick in his leg. The

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curtains drawn before the window jerked slightly. A faint greenish haze seemed to hang in the air for an instant, then disappeared. He scratched his leg with his free hand and dislodged a black pellet. Then he knew that the photo-interpretation group at Sawyer had finally found his trail. They knew exactly where he was, and now they were acting. They had just fired at least two PAX cartridges into the room, one of which had failed to go off. The little black object was a cartridge of that famous nerve gas.

During the Pittsburgh Bread Riots back in '81, screaming mobs, the type that dismember riot police, had been transformed into the most docile groups by a few spoken commands and a couple of grams of PAX diffused over the riot area. The stuff wasn't perfect, of course; in about half a per cent of the population there were undesirable side effects such as pseudo-epilepsy and permanent nerve damage; another half per cent weren't affected by normal dosages at all. But the great majority of people immediately lost all power to resist outside suggestion. He felt Sloane's grip loosening.

Norman pulled away and spoke to both men. "Give me a boost through that trapdoor."

"Yes, sir." The two men agreeably formed a stirrup and raised the chimpanzee toward the ceiling. As they did, Norman suddenly wondered why the gas had not affected him. *Because I'm not all here*! He answered himself with an almost hysterical chuckle. The gas could only affect the part of him that was physically present. And, though that was a very important part, he still retained some of his own initiative.

As Norman pushed open the trap, there was a splintering crash from the window as a buckrogers in full battle gear came hurtling feet first into the room. With a spastic heave, the chimp drew himself into the darkness above. From below he heard an almost plaintive, "Halt!" then Sloane's formerly menacing voice; "We'll go quietly, Officer."

Norman picked himself up and began running. The way was dimly lit from windows mounted far above. Now that his eyes were adjusted, he could see bulky crates around him and above him. He looked down, and gasped, for he could see crates below him, too. He seemed suspended. Then Norman remembered. In the dim light it wasn't too evident, but the floor and ceiling of this level were composed of heavy wire mesh. From a control board somewhere in the depths of the building, roller segments in the mesh could be turned on, and the bulkiest crates could be shuttled about the auto pier like toys. When in operation the pier could handle one million tons of merchandise a day; receiving prod-

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ucts from trucks, storing them for a short time, and then sliding them into the holds of superfreighters. This single pier had been expected to bring the steel industry to Marquette, thus telescoping the mining and manufacturing complexes into one. Perhaps after the Recovery it would fulfill its promise, but at the moment it was dead and dark.

Norman zigzagged around several crates, scampered up an incline. Behind him he could hear the infantrymen, shed of their flying gear, scrambling through the trap door.

They would never believe his honesty now that he had been seen consorting with the communists. Things did indeed look dark—he complimented himself on this pun delivered in the midst of danger—but he still had some slim chance of escaping capture and the terrible punishment that would be sure to follow. He had one undetonated PAX cartridge. Apparently its relatively gentle impact with his flesh had kept it from popping. Perhaps not all the soldiers were wearing the antiPAX nose filters—in which case he might be able to commandeer a helicopter. It was a wild idea, but the time for cautious plans was past.

The pier seemed to extend forever. Norman kept moving. He had to get away; and he was beginning to feel very sick. Maybe it was some effect of the gas. He ran faster, but even so he felt a growing terror. His mind seemed to be dissolving, disintegrating. Could *this* be the effect of PAX? He groped mentally for some explanation, but somehow he was having trouble remembering the most obvious things, while at the same time extraneous memories were swamping him more completely than they had for weeks. He should know what the source of the danger was, but somehow . . . *I'm not all here!* That was the answer! But he couldn't understand what its significance was anymore. He no longer could form rational plans. Only one goal remained—to get away from the things that were stalking him. The dim gray glow far ahead now seemed to offer some kind of safety. If he could only reach it. Intelligence was deserting him, and chaos was creeping in.

Faster!

3,456,628 more shopping days until Christmas . . . Latitude 40.9234°N, Longitude 121.3018°W: Semi-hardened Isis missile warehouse; 102 megatons total . . . Latitude 59.00160°N, Longitude 87.4763°W: Cluster of three Vega class Submarine Launched Ballistic Missiles; 35 megatons total . . . depth 105.4 fathoms . . . All-serv IFF codes as follows: I. 398547 . . .436344 . . . 51 . . . "Hey, let me out!" . . . *Master of jungle poised, knife ready as . . . the nature of this rock formation was not realized until the plutonist theory of Bender's . . . New Zealand*

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Harbor Defense of Wellington follows: Three antisubmarine detection rings at 10°98 miles from . . . REO factory depot Boise, Idaho contains 242,925 million-hp consumer fusion packs; inventory follows. Cold gray light shining in the eyes. And I must escape or . . . *"die with a stake driven through his heart," the professor laughed.* STOP or you'll fall; MOVE or you'll die; escape escape escape seascape orescape3scape5scape2 pecape4ea1a00p30 689135010-1121310100010101100001010101-000011111010101—

The chimpanzee crouched frozen and glared madly at the soft gray light coming through the window.

The tiny black face looked up from the starched white of the pillow and stared dazedly at the ceiling. Around the bed hung the glittering instruments of the SOmatic Support unit. Short of brain tissue damage, the SOS could sustain life in the most terribly mangled bodies. At the moment it was fighting pneumonia, TB, and polio in the patient on the bed.

Dunbar sniffed. The medical ward of the Labyrinth used all the latest procedures—gone was the antiseptic stink of earlier years. The germicidals used were a very subtle sort—and only a shade different from antipersonnel gases developed in the '60's and '70's. William Dunbar turned to Pederson, the only other human in the room. "According to the doctors, he'll make it." Dunbar gestured to the unconscious chimp. "And his reactions to those questions you asked him under truth drug indicate that no great damage has been done to his 'amplified personality.' "

"Yeah," Pederson replied, "but we won't know whether he responded truthfully until I have these co-ordinates for his computer checked out." He tapped the sheet of paper on which he had scrawled the numbers Norman had called off. "For all we know, he may be immune to truth drug in the same way he is to PAX."

"No, I think he probably told the truth, General. He is, after all, in a very confused state.

"Now that we know the location of his computer, it should be an easy matter to remove the critical information from it. When we try the invention on a man we can be much more careful with the information initially presented."

Pederson stared at him for a long moment. "I suppose you know that I've always opposed your project."

"Uh, yes," said Dunbar, startled, "though I can't understand why you do."

Pederson continued, apparently without noticing the other's answer, "I've never quite been able to convince my superiors of the dangers inherent in the things you

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want to do. I think I can convince them now and I intend to do everything in my power to see that your techniques are never tried on a human, or for that matter, on any creature."

Dunbar's jaw dropped. "But why? We *need* this invention! Nowadays there is so much knowledge in so many different areas that it is impossible for a man to become skilled in more than two or three of them. If we don't use this invention, most of that knowledge will sit in electronic warehouses waiting for insights and correlations that will never occur. The human-computer symbiosis can give man the jump on evolution and nature. Man's intellect can be ex—"

Pederson swore. "You and Bender make a pair, Dunbar; both of you see the effects of your inventions with narrow utopian blinders. But yours is by far the most dangerous of the two. Look what this one chimpanzee has done in under six hours—escaped from the most secure post in America, eluded a large armed force, and deduced the existence of an espionage net that we had completely overlooked. Catching him was more an *accident* than anything else. If he had had time to think about it, he probably would have deduced that distance limit and found some way to escape us that really would have worked. And this is what happens with an experimental *animal!* His intelligence has increased steadily as he developed a firmer command of his information banks. We captured him more or less by chance, and unless we act fast while he's drugged, we won't be able to hold him.

"And you want to try this thing on a man, who's starting out at a much higher level of intelligence!

"Tell me, Doctor, who are you going to give godhood to first, hm-m-m? If your choice is wrong, the product will be more satanic than divine. It will be a devil that we can not possibly beat except with the aid of some fortuitous accident, for we can't outthink that which, by definition, is smarter than we. The slightest instability on the part of the person you choose would mean the death or *domestication* of the entire human race."

Pederson relaxed, his voice becoming calmer. "There's an old saw, Doctor, that the only truly dangerous weapon is a man. By that standard, you have made the only advance in weaponry in the last one hundred thousand years!" He smiled tightly. "It may seem strange to you, but I oppose arms races and I intend to see that you don't start one."

William Dunbar stared, pale-faced, entertaining a dream and a nightmare at the same time. Pederson noted the scientist's expression with some satisfaction.

This tableau was interrupted by the buzzing of the comm. Pederson accepted the call. "Yes," he said,

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recognizing Smith's features on the screen.

"Sir, we just finished with those two fellows we picked up on the auto pier," the aide spoke somewhat nervously. "One is Boris Kuchenko, the yuk we've had spotted all along. The other is Ivan Sliv, who's been working for the last nine months as a code man at Sawyer under the name of Ian Sloane. We didn't suspect him at all before. Anyway, we gave both of them a deep-probe treatment, and then erased their memories of what's happened today, so we could release them and use them as tracers."

"Fine," replied Pederson.

"They've been doing the darndest things, those spies." Smith swallowed, "But that isn't what this call is about."

"Oh?"

"Can I talk? Are you alone?"

"Never mind, say it."

"Sir, this Sliv is really a top man. Some of his memories are under blocks that I'm sure the Russkies' never thought we could break. Sir —he knows of a project the Sovs are running in an artificial cave system under the Urals. They've taken a dog and wired it—wired it into a computer. Sliv has heard the dog talk, just like Dunbar's chimp. Apparently this is the big project they're pouring their resources into to the exclusion of all others. In fact, one of Sliv's main duties was to detect and obstruct any similar project here. When all the bugs have been worked out, Stark, or one of the other Red chiefs is going to use it on himself and—"

Pederson turned away from the screen, stopped listening. He half noticed Dunbar's face, even paler than before. He felt the same sinking, empty sensation he had four years before when he had heard of Bender's fusion pack. Always it was the same pattern: The invention, the analysis of the dangers, the attempt at suppression, and then the crushing knowledge that no invention can really be suppressed and that the present case is no exception. Invention came after invention, each with greater changes. Bender's pack would ultimately mean the dissolution of central collections of power, of cities—but Dunbar's invention meant an increased *capability* for invention.

Somewhere under the Urals slept a very smart son of a bitch indeed . . .

And so he must choose between the certain disaster of having a Russian dictator with superhuman intelligence, and the probable disaster involved in beating the enemy to the punch.

He knew what the decision must be; as a practical man he must adapt to changes beyond his control, must plan for the safest possible handling of the unavoidable.

. . . For better or worse, the world would soon be unimaginably different. ■

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She was a true cyborg;
she was a spaceship but she was also human.
Which makes peculiar problems, for how
do you comfort a ship who has lost her love . . . ?

The ship who mourned

ANNE McCAFFREY

Illustrated by Kelly Freas

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With eyes which did not register what they saw, Helva watched stolidly as the Regulus Base personnel broke ranks at the conclusion of Jennan's funeral. Never again, she vowed, would she be known as the ship who sang. That part of her had died with Jennan.

From somewhere very far away from her emotional centers, she impassively watched the little figures separate, pair off, walking rapidly to continue interrupted tasks or moving slowly back to the great Central Worlds Barracks. Some, passing, looked up but she did not interpret their glances. She had nowhere to move to and no desire to move anywhere away from the graveside of her dead partner.

It cannot end like this, she thought, anguish overpowering the stupor in her heart. *I cannot be like this. But what do I go on to now?*

"XH-834, Theoda of Medea requests permission to enter," said a voice at the base of her lift.

"Permission granted," Helva said.

So absorbed in her grief was Helva that by the time the lift had deposited the slender female figure at the lock, Helva had forgotten she had permitted entry. The woman advanced toward the central shaft behind which Helva was embedded in her shell. In her hand she held out a command reel.

"Well, insert it," snapped Helva when the woman made no other move.

"Where? I'm not regular service. The tape explains the mission but then I . . ."

"In the northwest quadrant of the central panel, you will observe a blue slot; insert the tape with the wind tab in position nearest the center red knob of the panel. Press the blue button marked 'relay' and if you are unaware of the text and are cleared for it, press the second yellow button marked 'audio.' Please be seated."

Dispassionately and with no more than a fleeting awareness that she ought to have put Theoda at her ease or made some attempt at graciousness, Helva watched the woman fumble before she was able to insert the tape. Theoda sank uncertainly into the pilot's chair as the tape began.

"XH-834, you will proceed in the company of Physiotherapist Theoda of Medea to the NDE, System Lyrae II, Annigoni IV, and present all aid possible in rehabilitation program of Van Gogh space plague survivors. All haste. All haste. All haste!"

Helva slammed the stop signal on the tape and called Central Control.

"Does Physiotherapist Theoda constitute my replacement?"

"No, XH-834, Theoda is not in Service. Your replacement is delayed in transit. Proceed in all haste, repeat, in all haste, to Annigoni."

"Request permission for immediate lift."

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Established routine procedures took Helva through pre-takeoff before she consciously realized what she was doing. Lifting off Regulus was the last thing she wanted but she had her order-tape and she had heard the imperative "all haste" repeated.

"All areas clear for lifting. Proceed. And XH-834. . . ?"

"Yes?"

"Good luck."

"Acknowledged," said Helva expressionlessly, ignoring the softened, unofficial farewell. To Theoda, she explained briefly how to strap herself into the pilot chair, following the woman's nervous fingers as they stumbled over the fastenings. Finally assured Theoda would be secure during acceleration, Helva lifted, her rear screen picking up the base cemetery as long as vision permitted.

It no longer made any difference to Helva what speed she attained but when she found herself increasing acceleration in an unconscious desire to finish her mission quickly and return to Regulus Base—and Jennan—she sternly measured her rate against Theoda's tolerance. Journey speed achieved, she told Theoda she could leave the chair.

Theoda unsnapped the harness and stood uncertainly.

"I was sent here so quickly and I've traveled twenty-four hours already," she said, looking down at her rumpled, dirty uniform.

"Quarters are aft the central column," and Helva gasped inwardly as she realized Theoda would inhabit the place so recently vacated by Jennan. Instinctively she glanced in the cabin to be startled by the realization that someone had already removed Jennan's personal effects. Not one momento remained of his tenancy, no souvenir of their brief happiness. Her feeling of desolation deepened. How could they? When had they? It was unfair. And now she must endure this fumbling female.

Theoda had already entered the cabin, throwing her kit bag on the bunk and entering the head. Helva politely withdrew her vision. She tried to make believe the homey noises of showering were Jennan's but her new passenger's ways were completely different. The difference, oh, the difference to me, cried Helva, mourning.

Lost in an elegy, she became only gradually aware of the quiet in the ship and scanning discreetly saw Theoda stretched out on her back in the limp, deep slumber of the exhausted. In repose, the woman was older than Helva had initially assumed from her ineptitude. Now, too, Helva justly attributed the fumbling to its true cause, exhaustion. The face was deeply lined with sorrow as well as fatigue; there were dark smudges under the closed eyes. The mouth was dragged down at the corners from familiarity with pain. The long, blunt-

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ended fingers twitched slightly in reflex to a disturbing dream and Helva could see the inherent strength and sensitivity, the marks of use in odd scars on palm and fingers, odd in an age where manual work was confined mainly to punching buttons.

Jennan had used his hands, too, came the unbidden comparison. Mourning reclaimed Helva.

"How long did I sleep?" mumbled Theoda breaking into Helva's reminiscences as the woman wove sleepily into the forward cabin. "How much longer is the trip?"

"You slept eighteen hours. The tape estimates an elapse of forty-nine hours galactic to Annigoni orbit."

"Oh," groaned Theoda in unhappy acceptance. "The galley?"

"First compartment on the right."

"Is there anything you require?" Theoda asked, halfway to the galley.

"My needs are supplied for the next hundred years," Helva said coldly, realizing as the words were formed that her critical need could not be met.

"I'm sorry. I know very little of you ships," Theoda apologized. "I've never had preferential treatment like this before," and she smiled shyly.

"Your home planet *is* Medea?" inquired Helva with reluctant courtesy. It was not uncommon for a professional person to claim the planet of his current employer.

"Yes, Medea," Theoda replied quietly. She made immediate noise with the rations she held, banging them onto the table with unnecessary violence. Her reaction signaled to Helva some inner conflict or grief, but she could recall nothing of great moment connected with Medea so she must assume Theoda's problem was personal.

"I've seen your type of ship before, of course. We of Medea have reason to be grateful to you, but I've never actually been in one." Theoda was talking nervously, her eyes restlessly searching over the supplies in the galley cupboards. Then she was rearranging containers to see the back of the shelves. "Do you enjoy your work? It must be a tremendous satisfaction."

Such innocent words to drop like hot cinders on Helva's unhealed grief. Rapidly Helva began to talk, anything to keep herself from being subjected to another such unpredictably rasping civility.

"I haven't been commissioned long," she managed to say. "As a physiotherapist you must certainly be aware of our origin."

"Oh, yes, of course. Birth defect," and Theoda looked embarrassed as if she had touched on a vulgar subject.

"Quite right. My deformity was too major to be surgically corrected and my parents were given the usual choice of euthanasia or recruiting me into the Service. My

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mind was *not* affected by the birth defects. By the time I was three months old I had been transferred into the first protective 'shell' and the synapses which would move legs and arms were diverted to mechanical means of propulsion."

"I still think it's horrible," Theoda blurted out, angrily. "You had no choice."

Helva felt suddenly superior. "Initially, perhaps not. But now, it would be very difficult to give up hurtling through space and be content with *walking*."

Theoda flushed at the almost scornful emphasis of the final word.

"I leave that to whoever is my 'brawn'," and Helva cringed as she reminded herself of Jennan.

"I've recently heard about one of your ships who sings," interjected Theoda.

"Yes, I have, too," said Helva unencouragingly. Must everything remind her of Jennan's loss!

"How long do you live?"

"As long as we wish."

"That is . . . I mean, who's the oldest ship?"

"One of the 200s is still in active service."

"You're not very old then, are you, being an 800?"

"No."

"I am," said Theoda, heavily, staring at the empty ration unit she held in one hand. "I am near my end now, I think." And there was no regret in her voice, not even resignation.

It occurred to Helva that here, too, was someone with deep sorrow, marking time.

"How many more hours until planetfall?"

"Forty-seven," Helva confirmed with some surprise to realize she had talked two hours.

"I must study," and abruptly Theoda rummaged in her kit for filmfile and viewer.

"What is the problem?" Helva asked politely.

"Van Gogh in Lyrae II was hit by a space plague similar in manifestation to that which attacked Medea one hundred twenty-five years ago," Theoda explained.

Suddenly Helva knew why Theoda had seen Service Ships. She microscoped her vision on Theoda's face and saw the tiny myriad lines that indicated advanced age. Theoda had undoubtedly been alive on Medea at the time of the plague. Helva recalled that the plague had struck a heavily populated area and swept with terrific violence throughout the entire planet in a matter of days; its onslaught so fierce and its toll so great that medical personnel often collapsed over the sick they tended. Others inexplicably survived untouched. The airborne disease spores struck animal as well as human and then, as suddenly as it had come, almost as if the disease were aware that the resources of a galaxy were on the way to subdue its ravages, it disappeared. Medea

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had been decimated in the course of a week and the survivors, both the ones hardy enough to endure the intense fever and pain, and those who were curiously immune, spent their years trying to discover source or cause, cure or vaccine.

From her capacious trained associative recall, Helva found seven other different but similarly inexplicable plague waves; some treated with better success than Medea. The plague on the planet Clematis had been ninety-three per cent successful in eliminating all human life before help could arrive and the planet had been placed under eternal quarantine. Helva thought that was rather locking the barn and never bothering to track down the missing horses.

"You had, I gather, sufficient experience with Medea's plague so that your presence may be of help to Van Gogh's people?"

"That is the thought," said Theoda, wincing. She picked up her filmviewer purposefully and Helva realized that more discussion was out of order. She knew, too, that Theoda still had painful word associations even at the end of her long life. Nor could Helva imagine a time centuries hence when mention of Jennan would not hurt.

Annigoni swam into view precisely as the trip chronometer edged onto sixty-seven hours, and Helva found herself immediately answering a quarantine warning from an orbital monitor.

"You have Physiotherapist Theoda on board, do you not?" Helva was queried after she identified herself.

"I do."

"Your landing should set you down as close to the hospital city of Erfar as possible. There is, however, no spacefield in that vicinity and a meadow has been set aside for your use. Are you able to control your dangerous exhausts?"

Helva was wryly amused by their lack of understanding of her type of ship but readily assured them of her ability to land circumspectly. They gave her the latitude and longitude and she had no difficulty in bringing herself to a stand in the patch-sized meadow described to her. A powdery white road led to its edge and half a mile beyond crouched a long white complex of multi-windowed buildings. From this direction a land vehicle came.

"Theoda," said Helva as they awaited the arrival of the landcar, "in the effects compartment under the control panel, you will find a small gray button. Attach it to your uniform and you have instant communication with me. If you would be good enough to rotate the upper section of the button clockwise, I can have two-way contact. It would accord me some satisfaction to be in on the problems you encounter."

"Yes, certainly, of course."

"If you rotate the bottom half of the button, I have limited scope vision as well."

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"How clever," murmured Theoda, examining the button in her hand before attaching it to her tunic.

As the car drew to a halt, Theoda waved at the occupants from the high lock and stepped onto the lift bar.

"Oh, Helva, thank you for the journey and my apologies. I'm not good company."

"Nor have I been. Good luck."

As Theoda descended, Helva knew that for a lie. They had been perfect company, each locked in separate miseries. Somehow it had escaped her that grief was a frequent visitor anywhere in the universe. That her inability to aid Jennan was scarcely unique. Her sister ships had all had such experiences and were still at their jobs.

None of them ever loved their brawns as I did Jennan, she soliloquized sullenly, perfectly conscious of how ill her sentiment befitted her steel, yet unable to extricate her thoughts from their unconscious return to misery.

"Request permission to board," came a rough voice at the lift bottom.

"Identification?"

"Senior Medical Officer Onro, Detached Regulus Base. I need to use your tight beam."

"Permission granted," replied Helva after a rapid check on the name in the MedOff roster of her file.

MedOff Onro plunged into her lock and, with the briefest of salutes at her central shaft, lunged into the pilot's chair and slapped home the call button on the beam.

"Have you any honest-to-God coffee?" he grated out, swiveling the chair to launch himself from it towards the galley.

"Be my guest," murmured Helva, unprepared for such vigor after several days of Theoda.

Onro's shoulder took a bruising as he careened off the threshold of the galley, wrenched open the cupboards, knocking containers about.

"Coffee may still be in its accustomed place on the third shelf of the right-hand locker," Helva remarked dryly. "Excuse me, a container just rolled onto the floor."

Onro retrieved it but cracked his head smartly on the corner of the cupboard door he had left open. The stream of invective Helva half expected did not come. The man carefully closed the cupboard with the controlled patience of the much-put-upon and breaking the coffee heat seal, immediately stalked back to the central cabin and resumed his seat, watching the dial on the tight beam as it warmed slowly to peak, never blinking as he gulped the now steaming hot coffee. With the first gulp, the springs in his taut frame began to unwind.

"Creatures of habit, aren't we, XH? I've been dreaming of coffee for eighteen mortal days and nights. The stuff they use in its

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place on this lousy lump of ill-assorted metals makes me sleepy. Coffee is not as potent as benzedrine nor half as rough on the system. Ah, there they are. I swear these beams take longer every time I have to fool with the things."

"Central Base Regulus."

"XH-834 reporting," announced Onro.

"Who?" gasped an unofficial voice.

"Onro talking."

"Yes, sir, didn't recognize your voice."

"Did you think Helva had a cold?"

"No, sir, that wasn't what I thought."

"Well, never mind the chitchat. Put this on the computers and let it do a little brainstorming. I'm too tired. You better check the computerese, too. I haven't been asleep much lately." He turned to Helva, "How d'ya like the luck? First home leave in three galactic years and I have to time my arrival with the plague's. I wonder if I can get a rebate on vacation time." He turned back to the beam. "Here's the garbage," and he rapidly dictated the material. "Now here's a verbal to check it."

"Disease unidentifiable on the Orson scale as a known virus or variation thereof. Patients thoroughly tested and apparently perfectly healthy can develop clinical symptoms in ten hours; complete deterioration of muscle control, presence of high fever, excessive spinal pain follow in three days. Death caused by 1) brain hemorrhage, 2) heart failure, 3) lung collapse, 4) strangulation or in case where medical help has been late in arriving, 5) starvation. All survivors unable to make muscular co-ordinations of any kind. Extent of brain damage negative. But they might as well be dead."

"Impairment to intellect?" asked Central Control.

"Impossible to ascertain except to hope that the injury to the brain has left the intellect alone."

"Julie O'Grady and the Colonel's Lady are sisters under the skin," muttered Helva for she could see through the MedOff's words that the victims of the plague were now as robbed of their bodies by disease as she had been by birth defects.

"Our skintight friend is closer to the truth than she knows," Onro snorted. "Except for infants, there isn't one of them that wouldn't be better off in a shell right now. They aren't going to go anywhere the way they are now."

"Do you wish to stand by for report?" asked Central Control.

"Take long?"

"You could get a little sleep," suggested Helva blandly, "these reports don't usually take too long," she added, tapping out a private distress signal to Central as she spoke.

"Not long, MedOfficer Onro," concurred Central on cue.

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"You'll get a crick in your neck, Onro," remarked Helva as she saw him stretch out his long legs and scrunch down in the pilot chair for a catnap. "Use the pilot's bed. I'll give you a jolt of coffee as soon as the message returns."

"You'd better or I'll unscrew your safety panel," Onro snapped, lurching drunkenly towards the bunk.

"Yes, of course," soothed Helva and watched as he took the two deep breaths that were all that were needed before he was oblivious.

Her contact with Theoda began, sight and sound. Theoda was bending over a bed, her strong fingers soothing the motionless frame of the woman there. Flaccid muscles, lack of reflexes, pasty skin, unfocusing eyes, loose mouth; the chords of the neck strained briefly as the patient made some incoherent sound deep in her throat.

"There is no sensation in the extremities that we can discover," an out-of-sight voice said. "There is some reaction to pain in the torso and in the face, but we can't be sure. The patient, if she understands us, can give us no sign."

Helva noticed, and she hoped that Theoda did, that the half-closed eyelids made an almost imperceptible downward motion, then upward. Helva also noticed the flaring of the nostrils.

"Theoda," she said quietly so as not to startle her. Even so, Theoda straightened quickly in surprise.

"Helva?"

"Yes. In the scope of my limited range of vision, I could see a twitch of the eyelids and a motion of the nostrils. If the paralysis is as acute as I have learned from MedOff Onro, these bare flickers may be the only muscle controls the patient has. Please ask one of the observers to concentrate on the right eye, another on the left and you observe only the nostrils. Establish a pattern of reply and explain it to the patient and see if she understands you."

"Is that the ship?" an off-sight voice demanded irritably.

"Yes, the XH-834 that brought me here."

"Oh," was the disparaging reply, "that's the one that sings. I thought it was the JH or GH."

"Helva is not an 'it'," said Theoda firmly. "Let us try her suggestion as her vision is considerably more acute than ours and her concentration far superior."

To the patient, Theoda said quietly and distinctly, "If you can hear me, please try to lower your right eyelid."

For an age-long second, there was no movement; then as though the effort were tremendous, the right lid slowly descended the barest fraction.

"In order to be sure this was not an involuntary motion, will you try to dilate your nostrils twice?"

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Very slowly, very slowly Helva caught the motion of the nostrils. She also saw, which was more important, the tiny beads of perspiration on the upper lip and brow and quickly called attention to them.

"What a tremendous effort this must be for that imprisoned mind," said Theoda with infinite compassion. Her bluntfingered hand rested softly on the moist forehead. "Rest now, dear. We will not press you further but now we have hope for you."

Only Helva was aware of the disconsolate sag and then straightening of Theoda's shoulders as she walked to the next bed.

Helva was with Theoda throughout the entire tour of the plague hospital, from the men's and women's wards to the children's and even into the nursery. The plague had been no respecter of age and babies of a few weeks had been affected.

"One would have hopes that in the younger and more resilient body those tissues which were damaged, if any have been, would stand the best chance of regeneration," remarked one of Theoda's guides. Helva caught part of a gesture which took in the fifty cribs of motionless infants in the ward.

Theoda leaned down and picked up a small pink, blond infant of three months. The flesh was firm, the color good. She tweaked the pectoral fold with unnecessary force. The baby's eyes widened and the mouth fell open. A slight croak issued from the throat.

Quickly Theoda snatched the child to her breast, rocking it in apology for the pain. Sight and sound were muffled by the blanket but not before Helva, too, had seen and realized exactly what Theoda had.

Theoda was rocking the child so that Helva caught only elusive fragments of a violent discussion. Then her scope of sight and sound returned as Theoda laid the child in the crib on its stomach and carefully started to move the child's arms and legs in an approximation of the crabbed action that is the beginning of independent locomotion.

"We will do this with every child, with every person, for one hour every morning and every afternoon. We will commandeer every adult and responsible adolescent in Annigoni if necessary for our therapists. If we are to reach the brain, to restore contact between intellect and nerve, we must repattern the brain centers from the very beginning of brain function. We must work quickly. Those poor imprisoned people have waited long enough to be released from their hells."

"But . . . but . . . on what do you base your premise, Physiotherapist Theoda? You admitted that the Medean plague has fewer points of similarity than originally thought."

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"I can't give you a premise right now. Why must I? My whole experience leads me to *know* that I am right."

"Experience? *I* think you mean 'intuition'," continued the official stuffily, "and we cannot, on the basis of one woman's intuition, conscript the work force needed from busy citizens . . ."

"Did you see the beads of sweat on that woman's face? The effort required to do so simple a thing as lower an eyelid?" demanded Theoda tartly. "Can any effort required of *us* be too much?"

"There is no need to be emotional," Theoda was told testily. "Annigoni has opened herself to these survivors with no thought of the danger of exposure to the same virus . . ."

"Nonsense," Theoda rasped, "before your ships approached Van Gogh you made certain that the plague had passed. But that is neither here nor there. I will return to the ship and contact Central Control." She whirled around, facing back into the ward where Helva could see the respectfully waiting ward nurses. "But any of you who love children and trust another woman's instinct, do as I just did whether it is authorized or not. There is nothing to be lost and the living to be released."

Theoda stormed out of the hospital, brushing aside the complaints and temporizing of the officials. She stumbled into the landcar, ordering it back to the ship in a tight, terrible voice that made the driver hold his tongue. Helva could see the strong fingers washing themselves, straining in a tense clasp of frustration, never idle, groping, grasping, clenching. Then Theoda reached up to the button and cut the contact abruptly.

Unconcerned, Helva switched to the wide vision of her own scanner and picked up the landcar as it sped towards her. The car discharged its passenger and left but Theoda did not step onto the lift. Somewhat at a disadvantage because of the angle, Helva could only watch as Theoda paced back and forth.

In the bunk, Onro slept on and Helva waited.

"Permission to enter," said Theoda finally, in a low voice.

"Granted."

Stumbling again, one hand in front of her as if feeling her way, Theoda entered the ship. Wearily she sagged into the pilot's chair and, leaning forward on the console, buried her head in her arms.

"You saw, Helva," muttered the therapist, "you saw. Those people have been like that for upwards of six weeks. How many will come out of this sane?"

"They have an additional hope, Theoda. Don't forget, once you can establish that the integral intellect remains, the body may be bypassed. There are advantages to that, you know," she reminded the therapist.

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Theoda's head came up and she turned in her chair, looking in amazement at the panel concealing Helva's shell-encased body.

"Of course. You're a prime example, aren't you?"

Then she shook her head in disagreement.

"No, Helva, it's one thing to be bred up to it, and another to be forced into it as the only expedient."

"The young would experience no shock at shell life. And there are, I repeat, advantages, even distinct gains to be made. Witness my ability to follow your tour."

"But to have walked, and touched, and smelled, and laughed and cried . . ."

"To have cried—" gasped Helva, "to be able to weep. Oh, yes," and an unendurable tightness filled her mind as her brief respite from grief dissolved.

"Helva . . . I . . . in the hospital . . . I mean, I'd heard that you had . . . .I'm sorry but I was so lost in my own problem that I just didn't realize that you were the ship who sang, and that you'd . . . " Her voice trailed off.

"Nor did I remember that at Medea the virus didn't just isolate the intellect in the body, it destroyed it, leaving a mindless husk."

Theoda turned her head away. "That baby, that poor baby."

"Central Control to the XH-834, are you receiving?"

Theoda, startled by the voice at her elbow, jerked back from the lighted tightbeam face.

"XH-834 receiving."

"Prepare to tape computer report on MedOfficer Onro's request."

Helva activated the apparatus and gave the A-O.K.

"Verbal?" asked Theoda in a stage whisper.

"Verbal requested," Helva relayed.

"No correlation between age, physical stature, health, ethnic group, blood type, tissue structure, diet, location, medical history is indicated. Disease random, epidemic force. No correlation muscle, bone, tissue, blood, sputum, urine, marrow in post-plague postmortem. Negative medication. Negative operation. Possible therapy."

"There!" cried Theoda in triumph, jumping to her feet. "Therapy the only positive."

"Only 'possible'."

"But the only *positive* factor, nonetheless. And I'm positive it's repatterning."

"Repatterning?"

"Yes. It's a bizarre therapy and it doesn't always work but the failure may have been because the intellect had retreated in desperation," Theoda argued with vehement confidence. "To be trapped, unable to make even the simplest communication, can you imagine how ghastly that must be? Oh, what am I saying?" she gasped,

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turning in horror towards Helva's presence.

"You're quite right," Helva assured her blandly with inner amusement. "It would be intolerable if I could no longer control the synapses I do now electronically. I think I should go mad having known what it is to drive between the stars, to talk across light-years, to eavesdrop in tight places, maintaining my own discreet impregnability."

Theoda resumed her restless pacing.

"But you don't think," Helva pointed out, "that you are going to get those skeptics to do the necessary recruiting on the basis of the computer report?"

"The therapy was a positive factor," Theoda insisted stubbornly.

"It was a 'possible'," Helva corrected mercilessly. "I'm not arguing with your position, only pointing out their reaction," she added as she saw Theoda gathering to protest. "I'm convinced. They won't be and it also won't be the first time when good samaritans have decided to rest on their laurels prematurely assured they have done in conscience all they could."

Theoda set her lips.

"I'm positive those people can be saved . . . or at least enough of them to make every effort worthwhile."

"Why? I mean, why do you think repatterning will do the trick?"

"It's a twentieth century technique, used before the correction of the majority of pre-natal defects. It was also used with some severe brain or neural accidents. I took my degree in Physiotherapeutic history. So many of the early problems in the field no longer exist but occasionally, of course, an ancient disease reappears suddenly. Like the epidemic of poliomyelitis on Evarts II. Then the old skills are revived.

"This plague, for instance, is like the Rathje Virus; only the original strain attacked sporadically and recovery was slow but certain. Perhaps because therapy was initiated as soon as the painful phase passed. Also, I believe that the paralysis was not so acute but the strain has obviously mutated in the centuries and become more virulent.

"However, the similarity cannot be denied. I brought my tapes, Helva," Theoda said eagerly, enthusiasm livening her face with a semblance of youth. "And the Doman-Delacato repatterning was used with great effect on the latter victims of the Rathje Virus.

"You don't suppose," and Theoda stopped dead in her tracks, "we could also prove that the space plague spores had passed by old Terra at that time? Have you any details on galactic spiral patterns?"

"Stick to medical and physiological aspects, Theoda," laughed Helva.

Theoda scrubbed at her face with her hands as though she would wash not only fatigue out but inspiration from her tired brain.

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"Just one child, one proof is all I need."

"How long would it take? What age child is best? Why a child? Why not that poor woman of the eyelid?"

"The medulla handles reflex action at birth. The pons, maturing at twenty weeks, directs crawling on the stomach. By fifteen weeks, the midbrain has begun to function and the child begins to learn to creep on hands and knees. By sixty weeks, the cortex begins to act and controls walking, speech, vision, hearing, tactile and manual competence."

"A year would be too young, no understandable speech," Helva mused out loud, remembering her first birthday without effort. But she had already been "walking" and "talking".

"The best age is five," said another voice. Theoda gasped as she saw Onro standing in the galley, a warming container in one hand. "Because that is the age of my son. I'm Onro, MedOfficer, and I sent for you, Physiotherapist Theoda, because I heard you never give up." His face, still creased with blank folds, turned hard, determined. "Well, I won't give up either until my son walks, talks and laughs again. He's all I have left of what was to have been such a happy homecoming." Onro laughed bitterly then gulped at the steaming coffee.

"You're Van Goghian?" Theoda demanded.

"By chance, and one of the immunes."

"You heard what I was saying? You agree?"

"I've heard. I neither agree nor disagree. I'll try anything that has a semblance of reason. Your idea is reasonable and the computer has only one positive thought . . . therapy. I'll bring my son."

He turned when he reached the lock, shook his fist back at Helva. "You drugged me, you sorceress."

"An inaccurate analysis but the insult is accepted," Helva laughed as he disappeared, scowling, down the lift.

Elated, Theoda snatched her viewer out and carefully restudied the films of the technique she would try.

"They used steroids as medications," she mumbled. "Have you any?"

"No medication was indicated on the report," Helva reminded her, "but you can get Onro to steal you the ones you require from the synthesizer in the hospital easily enough. He *is* a Senior MedOfficer."

"Yes, yes, that helps," and Theoda lapsed again into fierce concentration. "Why did they use . . . oh, yes, of course. They didn't have any conglomerates, did they?"

Helva watched fascinated as Theoda scanned through the film, winding and rewinding, rechecking, making notations, muttering to herself, pausing to gaze off into space in abstracted thought.

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When she had been through her notes the fourth time, Helva insisted with authority that Theoda eat something. She had just finished the stew when Onro returned with the limp body of a redheaded child in his arms. Onro's rough face was impassive, almost rigid in its lack of expression as the child was tenderly put down on the bunk. Helva noticed the almost universal trait of the victims, the half-closed eyes, as if the lids were too heavy to keep open.

Kneeling down beside the bunk, Theoda turned the boy's face so that her eyes were directly on a level with his.

"Child, I know you can hear. We are going to work your body to help you remember what your body could do. Soon we will have you running under the sun again."

Without more ado and disregarding Onro's guttural protest, she placed the boy on his stomach on the deck, seized one arm and one leg and signaled to Onro to do likewise.

"We are taking you back to the time when you were a baby and first tried to creep. We are making your body crawl forward on your belly like a snake."

In a patient monotone, she droned her instructions. Helva timed the performance at fifteen minutes. They waited a full hour and repeated the drill. Another hour passed and Theoda, equally patient, droned instructions to pattern the child's body in a walking, upright position, alternating the left hand with right foot, and right hand with left foot. Another hour and she repeated the walking. Then back to the crawling, again and again in double repetition, while the two therapists caught naps where they could. Surreptitiously, Helva closed her lock, cut the cabin audio on her relays and ignored the insistent radio demands from the Hospital that she put Theoda or Onro on the radio. After twenty-four hours, Theoda alternated the two patterns, and included basic muscular therapy on the lax body, patiently, patiently manipulating the limbs in the various attitudes and postures, down to the young toes and fingers.

By the twenty-seventh hour, Onro, worn by previous exhaustion, frustration and increasing hopelessness, dropped into a sleep from which violent shaking could not rouse him. Theoda, looking more and more gray, continued, making each repetition of every motion as carefully and fully as she had the first time she started the intensive repatterning.

"Theoda," Helva said softly in the thirtieth hour, "have you noticed as I have the tendency of the neck muscles to contort?"

"Yes, I have. And this child was once so far gone that a tracheotomy was necessary. Notice the scar here," and she pointed to the thin mark. "I see, too, that the eyelids

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describe a slightly larger arc than when we began the therapy. The child knows we are helping him. See, his eyes open . . . ever so slightly, but it is enough. I was right! I knew I was right!"

"You won't have much more time," Helva said. "The authorities of Annigoni have called in a Service craft and it is due to land beside me in half an hour. I will be forced to open or risk damage to the ship which I am conditioned to avoid."

Theoda looked up startled.

"What do you mean?"

"Look in my screen," and Helva turned on the picture at the pilot's console so that Theoda could see the crowd of people and vehicles clustered at the base of the ship. "They are getting a bit insistent."

"I had no idea," the therapist gasped.

"You needed quiet. I could at least supply that," Helva replied. "But to all intents and purposes, their Senior Medical Officer and his son, their visiting technical advisor, are imprisoned inside me and they suspect that my recent . . . that I am turning rogue."

"But didn't you tell them we were conducting therapy . . ."

"Naturally."

"Of all the ridiculous . . ."

"It's time for therapy. Every minute is necessary now."

"First he must be fed."

Theoda carefully inserted the concentrated solution in the thin vein, smoothing down the lump that formed as the nutritive spray entered.

"A sweet child, I imagine, Helva, from his face," she said lovingly.

"A young hellion with all those freckles," snorted Helva.

"They are usually the sweetest inside," Theoda said firmly.

Helva noticed the eyelids droop down on the cheek and then raise again. She decided she was right, not the therapist. Imagine calling red hair and freckles sweet!

Again the patient routine, the assisted patterning and then a loud thud startled Theoda. It shook the sleeping form of the doctor where he lay on the deck. Helva, with one eye outside, had expected the blow Onro roused himself garrulously unaware at first of his surroundings.

"Whassa matter?"

A second dull thud.

"Whatinell's happening? Who's knocking?"

"Half the planet," remarked Helva dryly and opened up both outside visual and aural to her companions. She immediately cut down the nearly deafening noise.

"All right, all right," she said loudly to the audience, her voice amplifying easily over their angry roars.

"DEMAND PERMISSION TO ENTER, XH-834," squalled someone at her base. She meekly activated the lift and opened the lock.

Onro stamped to the opening

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and leaned down, shouting. "Whatinells's the matter here? Go 'way, all of you. Have you no decency? What's the fuss about? Can't a man get some sleep around here? Only quiet place on the whole lousy planet," he roared.

The lift had by then come abreast of him with the "brawn" from the Service ship and the stuffy hospital official of Theoda's tour.

"MedOfficer Onro, we feared for you, particularly when your son was discovered missing from his bed."

"Administrator Carif, did you expect that the lady therapist had kidnaped me and my son and was holding me hostage on a rogue ship? Romanticists all. Hey, what are you doing . . . you young squirt," he demanded as the "brawn" made a pass at the protected panel of Helva's shaft.

"I am following orders from Central Control."

"You warm up that tightbeam and tell Central Control to mind its own business. Weren't for Helva here and the peace and quiet she maintained for us, don't know where we'd be at."

He stalked into the cabin where his son again lay on the floor, with Theoda painstakingly applying her Doman-Delacato therapy.

"Don't know how many we'll save this way, but it does work and you, young man, will tell Central Control, after you've told them to go to hell for me, that they will issue authority to Theoda to recruit any and all . . . if necessary . . . of this planet's population as a therapy force to activate her rehabilitation program."

He got down on his knees by his son.

"All right, boy, crawl."

"Why, that child will catch a cold in this draft . . ." the official exclaimed.

Some woman was trying to get Helva to lower the lift for her but Helva ignored her as the beads of sweat started on the child's face. There was no muscular movement, not so much as a twitch.

"Son, try. Try. Try!" pleaded Onro.

"Your mind remembers what your body once could do, right arm forward, left knee up," urged Theoda with such control that no hint of the tension she must feel showed in her calm gentle tones.

Helva could see the boy's throat muscles moving convulsively but she knew the watchers were expecting more dramatic motions.

"Come on, momma's sweet little freckled-face boy," she drawled in an irritatingly insulting voice.

Before the annoyed watchers could turn to remonstrate her, an elbow had actually slid an inch on the floor and the left knee, slightly flexed by Theoda's hands, skidded behind as the throat worked violently and a croaking sound issued from the lips. With a cry of inarticulate joy, Onro clasped his son to him.

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"You see, you see. Theoda was right."

"I see that the child made a voluntary movement, yes," Carif was forced to agree. "But one isolated example is . . ." he spread his hands expressively unconvinced.

"One is enough. We haven't had time for more," Onro pleaded. "I'll put it to the people out there. They'll be the work force."

Carrying his son to the lock, he yelled down what had happened. There was great cheering and applause. Then the little group at the base of the ship kept pointing urgently to the woman who had begged for the lift.

"I can't hear you," Onro shouted down, for many people were shouting at once, all trying to get across the same idea.

Helva sent the lift down and the woman came up it. As soon as she was halfway to Onro she shouted her message.

"In the nursery, we did as Therapist Theoda suggested. There is already some improvement among the children. Not much, not much and we want to know what we are doing wrong. But four of the babies are already able to cry," she babbled, stepping in to the ship and running to Theoda where the woman leaned wearily against the door jamb. "I never expected to be happy to hear a baby cry again. But some are crying and some are making awful sounds, and one little girl even waved a hand when she was diapered."

Theoda looked her triumph at Carif and he, shrugging acceptance of the accomplishment, nodded.

"Now, Carif," said Onro briskly, stepping into the lift, his son still cradled in his arms, "this is what we'll do. How we'll organize. We don't have to take everyone on your very busy planet. The Youth Corps can be called in from Avalon. Just their bag of tricks," Helva heard him say as his voice died away.

"Thank you for believing in me," Theoda told the nurse.

"One of the babies was my sister's," the woman said softly, with tears in her eyes, "and she's the only one left of the entire town."

The lift had come back up and the "brawn" and the nurse took it. Theoda had to pack her gear.

"The easy part is over, Helva, now it's all uphill, encouraging, instructing, upholding patience. Even Onro's son has a long, long way to go with therapy before he approaches his pre-plague physical condition."

"But at least there is hope."

"There is always hope while there is life."

"Was it *your* son?" asked Helva.

"Yes, and my daughter, my husband, my whole family. I was the only immune," and Theoda's face contorted. "With all my training, with all the skill of years of practice, I couldn't save them."

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Theoda's eyes closed against that remembered agony.

Helva blacked out her own vision with a deep indrawn mental breath as Theoda's words echoed the protest she herself had voiced at her ineffectuality. It still burned in her mind: the searing memory of Jennan, looking at her as he died.

"I don't know why one makes a certain emotional adjustment," Theoda said wearily. "I guess it's the survival factor in you, forcing you to go on, preserving sanity and identity by a refocusing of values. I felt that if I could learn my profession so well that never again would I have to watch someone I loved die because of my ineffectiveness, then the ignorance which killed my family would be forgiven."

"But how could you have stopped a space plague?" Helva demanded.

"Oh, I know I couldn't have, but I still don't forgive myself."

Helva turned Theoda's words over in her mind, letting their significance sink into her like an anesthetic salve.

"Thank you, Theoda," she said finally, looking again at the therapist. "What are you crying for?" she asked, astonished to see Theoda, sitting on the edge of the bunk, tears streaming unheeded down her face.

"You. Because you can't, can you? And you lost your Jennan and they never even gave you a chance to rest. They just ordered you up to take me here and . . ."

Helva stared at Theoda, torn with a variety of emotions: incredulous that someone else did understand her grief over Jennan; that Theoda was, at the moment of her own triumph, concerned by Helva's sorrow. She felt the hard knot of grief coming untied and she was suddenly rather astonished that she, Helva, was the object of pity.

"By the Almighty, Helva, wake up," shouted Onro at the base and Helva hurriedly sent down the lift for him. Shortly he charged into the cabin.

"What on earth are you crying for? Don't bother to answer," he rattled on, snatching Theoda's kitbag from her limp hands and plowing into the galley. "It's undoubtedly in a good cause. But there's a whole planet waiting for your instructions . . ." He was scooping up all the coffee containers he could find and stuffing them into the kitbag, and his pockets. "I promise you can cry all you want once you've given me the therapy routine." He made a cradle of her hands and piled more coffee cans on. "Then I'll lend you my shoulder."

"She's got mine any time she wants," Helva put in a little unsteadily.

Onro stopped long enough to glance at Helva.

"You're not making sense either," he said irascibly. "You haven't *got* a shoulder."

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"She's making perfectly good sense," Theoda said stoutly as Onro started pushing her towards the lock.

"Come on, Theoda, come on."

She shook off his hand and turned back once more to Helva.

"Thank you, my friend," Theoda murmured and then whirled away, allowing Onro to start the lift.

"No, no, Theoda, I'm the one who's grateful," Helva called as Theoda's head disappeared past the edge of the lock. Softly, to herself, she added. "Your tears were what I really needed."

As the landcar zoomed back towards the hospital complex, Helva could see Theoda's arm waving farewell and knew Theoda understood all that hadn't been said. She smiled to herself. The dust settled down on the road to the hospital as she signaled Regulus Base of the completion of her mission and her estimated return.

Then, like a phoenix rising again from the bitter ashes of her hundred hours' mourning, Helva lifted on the brilliant tail of exploding fuel towards the stars, and healing. ■

IN TIMES TO COME

As most science-fiction fans know by now, Dr. E. E. Smith, "Doc" Smith of "Skylark" and "Galactic Patrol" fame, died early last fall, of a heart attack.

Next month's feature story—cover by Freas—is not a last Doc Smith story, but a first story by William B. Ellern, titled "Moon Prospector." But the story is laid in "Doc" Smith's Galactic Patrol universe—it is, in essence, a story of one of the sidelights of the Boskone-Civilization War that Doc didn't write up.

Ellern sent the story to me; I liked it as a yarn, but pointed out that since he was using Doc's universe, he ought to get Doc's permission.

So the story was sent to Doc Smith for review.

Just about three days before the totally unexpected heart attack took him, Doc returned the story with comments—and his hearty agreement to Ellern's use of his Galactic Patrol universe.

That Doc's influence on science fiction will never die is self-evident—but Ellern's story represents a very direct and special class of Smith-influenced science fiction!

THE EDITOR

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Giant Meteor Impact 61

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This is fiction . . . in certain minor details. But the facts exist. This particular impact hasn't happened — in human history. But the Earth has longer memory, and the monstrous astroblemes are clear records of the things that Earth remembers!

BY J.E. ENEVER

The Federation Warning Post at Grimaldi perches on the rim of the crater. It was built with the five other Lunar posts, when power plays by member nations were still conceivable. Their radars have been kept abreast of discovery, and, though they have never tracked a hostile, are still the most sensitive in existence.

At this moment, Grimaldi is "out" for installation of an improved transmitter module. The Post Commander's desk is, therefore, adorned by his large boots in addition to the usual house phone and the hot radiophone link to Earth.

The house phone rings: Control console calling. The Commander reflects that Smittie must have bal-

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anced in the new circuit. We're operational again.

"Lo, Smittie, got it working?"

"Yes—but listen, Chiefie, I turned up an echo on my trial sweep. Unbelievably big . . ."

The Commander is very definitely interested. No interplanetary research flights are currently scheduled, and there can be no reason for normal traffic to wander out of the Lunar Commercial lanes into Grimaldi's sector.

"A ship, Smittie?"

"Not unless someone has built a ship with a square mile surface, Chief. It can't be anything except a big, big meteor—moving in the ecliptic, already across the moon's orbit. Even from our angle—it's something like 110° round from us —it's dopplering in like hell."

Chiefie has removed his boots from the desk and is hustling up to the control room.

Smith proves to be right. It can be nothing but a meteor; the size is asteroidal. And, if it misses Earth at all, it will be a very close shave.

The Post Commander happens to have read the form where large meteorites are concerned. In a matter of two hours—no more—tens of billions of tons may hurtle down upon some unsuspecting metropolis; wherever the target may be, a crater some scores of miles across will be blasted out. A fireball nearly as wide as the crater will shower heat and hard radiation on the area. The district beyond the crater rim will be bombarded by a lighter scattering of debris. Earth tremors more devastating than any natural 'quake will ripple out across the continent. A Nation will be devastated, and any human within a hundred miles of the crater will be triply slain, first by X rays, next by blast, finally by incineration.

For ten seconds, Chiefie is paralyzed by sheer cold panic. Why, oh why must he, of all creatures ever born, be saddled with this load? But the Commander is made to the full measure of a man. Forewarning is his trade. If forewarning, plus modern transport, will save a single life, he will so save it.

The first step is relatively easy. The commander lifts the hot radiophone. In two minutes he is through to the Inspector General, Federation Arm, in New York. Five minutes later every vital landline and radio channel on Earth is cleared and silent, its operator poised for action. Here, Chiefie is aided by the fact that he is following his normal chain of command, and probing past disciplined superiors who know him and trust each other.

What comes next is harder. The Grimaldi post is admirably equipped for detection and location. What it lacks is a computer which will draw a ballistic trajectory correct to the tenth decimal.

He knows where there is just such an instrument—in Traffic Control at the Copernicus City spaceport. There is now just about one hundred

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minutes to go before that meteor hits, or misses.

It takes Chiefie thirty-five of those minutes to establish a working link with Traffic Control. You think that is slow? Listen, brother —the speed with which Chiefie moves here is what wins him the Star of Honor in iridium instead of in gold. Did *you* ever try to operate one government department as servant of another? Gross Departures from Approved Channels and Serious Deviations from Normal Procedures are involved! The Commander has to raise Signals Superintendent at the Spaceport, and disabuse him of the idea that his leg is being pulled. He must then reach and similarly disabuse the Traffic Controller. The Computer Programmer, who just dived into a cup of coffee, has to be pulled out of it and briefed. The buck must be passed at every one of these steps. This sounds comic, but Chiefie finds small joy in the hassle. But he goes through with it, and is finally able to dictate his problem to the computer, several hundred miles away. If, my friend, you consider thirty-five minutes slow for all that, you've spent your life on Easter Island.

An hour to go. The Grimaldi radars do not compute, but they locate nearly to the thickness of the proverbial bee's wing. Smittie has been making them do just this, again, and again, and again, clocking the positions on the record with nano-second accuracy.

By M-minute minus 55, the Copernicus computer is defining the meteor's path with increasing accuracy, using Smittie's data.

A first solution comes through. It is real bad news. There is no doubt about it—the meteor *will* hit Earth.

By M minus 50, plots are coming in from the big lidars and radars up on Earth. They have probed for the intruder, found it, located it. Working together, the ganged instruments are fixing the course with still more precision. The best computers on Earth are now joining in a second extrapolation of the point of impact. This comes through at about M minus 40. The news is better; the new prediction is that the meteor will fall somewhere in the South Pacific.

Perhaps it is going to splash rather than thump. If you wonder why, hold out a stiffish curved wire by one end. Try to keep it rock-steady. At every imperceptible tremor of your hand, the far end of the wire sweeps through a considerable volume of space. This is how a courier capsule which deviates a skillionth of a degree at launch from earth misses the moon by a hundred thousand miles. This is the reason for uncertainty about the meteor's precise target.

M-minute minus 30. The bolide is much closer now. Successive fixes have become more and more exact. The errors are steadily narrowing, corrections have lined out the tra-

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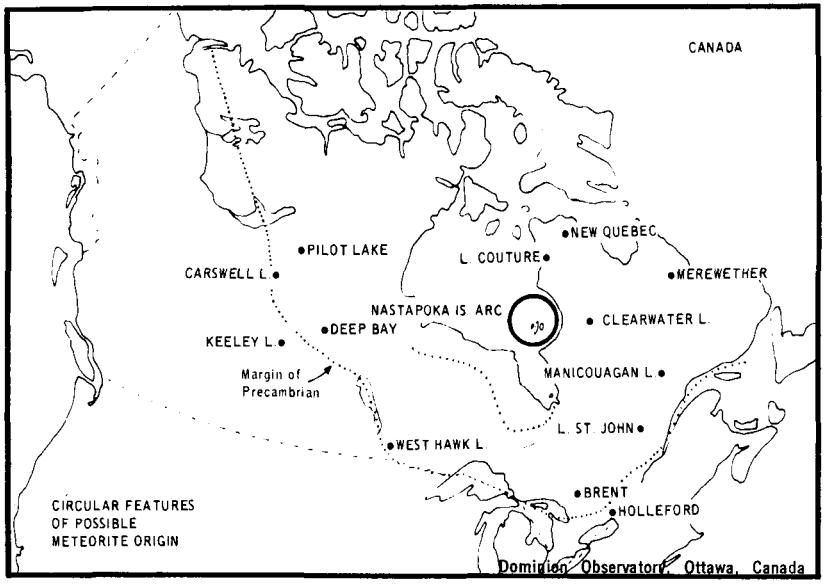

Circular structures of possible meteoritic origin.

jectory more exactly. The meteor's position and vector are now known with all the accuracy which can be of any practical importance.

The last solution comes in. Tens of billions of tons are going to strike. They will fall at fifty kilometers per second, but will drop almost exactly midway between New Zealand and Chile—Longitude, 121° 25′ West, Latitude 42° 41′ South, plus or minus 9′ in each case.

Not a thump, but a mid-ocean splash.

Up on Earth, a man sitting in the thorniest worry seat in all history takes his index finger off the Panic Button.

The panic is over. . . .

OR IS IT?

The piece of fiction just presented is founded on the strictest fact. Earth has been repeatedly hit by very large meteorites, their speed unchecked by virtue of their enormous size. Evidence for this has been piling up for the past sixty years. Scores of able workers in other disciplines have dug hard for the data we now hold. Soon, the seeds which they are sowing will flourish as a new exact science—the study of Meteoritics. The odd point is, however, that none of these workers has yet noticed the simple fact which is crucial to the climax of my

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little story. The problem here is certainly real, and is distinctly important. Something that matters has been overlooked.

I'm going to take you back to the beginning of the story. To follow its development through to the present end, we are going to make a few calculations. Little more than simple arithmetic is needed for these.

That "little more" is knowledge of these easy facts:

1. That $e = \frac{1}{2} m \times v^2$. The energy of a moving body equals half its mass times the square of its velocity.
2. When the moving body is involved in a collision, the energy of movement degrades into heat. The exchange is at known rates for various materials.

The first evidence for a strike by a large meteorite was given by the Barringer brothers early this century. Here "large" means "ranging over 1,000 tons weight." The Barringers showed that the Canyon Diablo crater was formed by meteoric impact. Naturally, the demonstration met with the most pigheaded resistance from precisely those who should preserve the most open minds. Despite these people, the concept finally percolated . . . but even as late as 1930, the Barringer Crater could still provide a fresh theme for a story in the old *Amazing*.

Well over forty similar cases are now either well proven, or listed as suspect on very good grounds. Two or three more are added yearly.

Some, or all, of the following clues provide the evidence:

1. Cratering of a generally circular shape. Whatever the angle of collision, the meteorite's impact is violently explosive. Its speed, and thus the speed of the blast of superhot gases which results, vastly transcend those of chemical reactions. The power of the Barringer strike was about 2½ megatons of TNT, and it blasted a crater about 4,000 feet across.

You can model the process in miniature yourself. Spread a target of loose cement dust three inches thick on your garage floor. Shoot loose slugs of cement dust into this target from the mouth of a very small container. Getting the slugs to cohere yet hit fast will call for practice, or perhaps some ingenious contrivance. Once you get them hitting fast enough, you will produce *circular* craters in your target, whatever the angle of impact. Occasionally, material ejected from the crater will make chains of craterlets outside the crater rim, like those around the big lunar craters. Quite often you will reproduce central peaks within the craters, and, if you sprinkle a layer of limestone dust or some other distinctive powder over the target, you will now and again make replicas of the rays round the lunar craters.

2. The material of the crater floor is broken. This "breccia" grades from rock-flour at the sur-

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face to boulder-size at depth.

3. This disturbance is detectable under large craters even when all surface traces have been eroded, or covered by loess or by sedimentary rock. Gravimetric surveys show anomalously low densities beneath the crater floor.

4. Minute spherules of iron, 0.1 mm. or so across, which condense from vapors produced by the impact flare, may be distributed around the crater.

5. The unusual minerals, coesite and stishkovite, first identified near meteorite craters, are found only at these places. They are dense silicates created by the pressure of the explosion.

6. Rocks surrounding the crater are likely to be shattered in a unique fashion. Compression waves originating from the strike diffract on small irregularities within the rock. This then breaks into *shatter cones* pointing to the center of impact. This piece of evidence also outlives complete deletion of surface traces.

7. When the diameters of various types of explosion crater are graphed against their depths, the incidents group upon a quite remarkably smooth curve. This includes craters from small chemical explosions, from nuclear charges, from the terrestrial meteorite strikes, and finally the lunar craters. The curve *excludes* most volcanic craters—both the conical types, such as Vesuvius, and the Hawaiian shield craters such as Mauna Loa.

The Barringer Crater is very far from being the largest known on Earth. It could have been caused by a body weighing 10,000 tons, striking at nearly 40 kilometers per second.

The meteor which occasioned the Vredevoort Ring in South Africa was much bigger. Its volume has been estimated at a cubic mile. Blasting out the sedimentary strata, it exposed naked magma at the base of a pit scores of miles wide. At the lip of the ring, the strata were turned over to show the stratigraphic sequence in horizontal, concentric rings. The hell-pit then refilled with magma from the depths.

Larger events still have been claimed. For example, Hudson's Bay and the Japan and Weddell seas have been said to have originated in the same way. Mr. Rene Gallant, puts forward strikes by Junoesque bodies, at energies totaling more than 10^{33} ergs. This, by the way, is a quarter of the Sun's entire output of energy for an entire second! It equals the *complete* conversion to energy of a million tons of matter or the explosion of a hundred thousand million million tons—yes, seventeen zeros after the figure one—of TNT.

Very circumstantial proof should be given before these are accepted. If as little as one per cent of the energy of such an impact transferred as heat to the world's atmosphere, the air temperature everywhere would rise by about 200° C. My

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TEN CANADIAN CRATERS

(Not all of these are situated on the Shield)

Name	Diameter of circular feature as seen now	Estimated diameter of the original rim of crater	*Upper* limit of age of strike
HOLLEFORD	2.35 km.	2.35 km.	5 megacenturies
NEW QUEBEC	3.7 km.	3.7 km.	1-2 megayears
BRENT	3.0 km.	3.7 km.	5 megacenturies
WEST HAWK	3.3 km.	3.9 km.	5½ megacenturies
DEEP BAY	10 km.	10.5 km.	2½ megacenturies
LAC COUTURE	14 km.	10 km.	6 megacenturies
CLEARWATER EAST	21 km.	18 km.	4 magacenturies (Twin strike)
CLEARWATER WEST	32 km.	32 km.	4 megacenturies
CARSWELL LAKE	32 km.	30 km.	5 megacenturies
MANICOUAGAN	60 km.	65 km.	3 megacenturies

After M. R. Dence, Dominion Observatory, Ottawa

calculation here is approximate, since it ignores the work which the heat would do in expanding the atmosphere; but my one per cent heat allowance is obviously niggardly. Strikes by major asteroids seem to be the instant recipe for pasteurized planet. They also violate the law of parsimony. Nonetheless, you must notice that even the Vredevoort event yielded *more than a million megatons of TNT.*

It is calculated that meteorites as heavy as 1,000 tons and up are all but unchecked by the atmosphere. They strike the ground with nearly all their original speed. This ranges from about 20 kilometers per second to just over 70 k.p.s. The higher figure is the maximum which any member of the solar system can attain at the Earth's distance from the sun. The limit for a body which moves in from the galaxy with some speed to begin with is clearly much higher. A few small meteors have, in fact, been tracked by radar at over 150 k.p.s.

As the meteorite dives to the surface, there will be a formidable pressure wave. At Mach numbers 60 to 200 the sonic boom will be awesome. But it will not only be short-lived; it will be dwarfed by the blast arising from the surface impact. The relatively small Siberian shower of 1908 flattened the conifers of the Taiga to a range of 30 miles.

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There are many other effects:

(a) Heat. In a large strike, the instant flare of the impact is reckoned to convert more than a quarter of the total energy into prompt heat. You should notice that in the end almost *all* the energy will degrade into heat. There is an exception, see (e) below; and for some effects, the degradation will take a considerable time.

A feature of large strikes such as Vredevoort is that the fireball must be enormous. Think of it as that from a 250,000 megaton fusion bomb. It will probably not reach the diameter of 200 miles given by a cube-root-of-power comparison with an "ordinary" Hydrogen bomb. But its measurements will *certainly* exceed the total depth of the atmosphere and stratosphere together. As a result of this, the fireball will squat upon the target area, doming up into the ionosphere, but unable to rise. It will radiate terrific energy into space. Even when the fireball has at last cooled out, the target will glow for weeks and months—again radiating a good deal of energy into space.

(b) Severe earthquakes will damage the crust.

(c) Material will be ejected beyond the crater's periphery. This will range from large crustal blocks down to microscopic powder; some of this material will travel a long way.

(d) Volatilized matter and even plasma will be thrown out to space at escape speed. Here, see Ralph Hall's fact article, "Secondary Meteorites," January and February issues, 1964.

(e) There will be some exchange of impetus between the meteorite and the spinning Earth. Substantially, this would be confined to alteration of the Earth's axial tilt and rotation period. Even an impact by Juno would affect the orbital speed by only a few centimeters per second. The reference here is to Rene Gallant's book, "Bombarded Earth," published in London by Baker.

Not merely are staggering energies released. The explosion has high "brisance," is shatteringly intense. Tremendous temperatures combine with tremendous pressures. Ralph Hall explained that nuclear reactions will occur at the heart of the flare. These, I think, may just as well *absorb* energy as release it, but either way, there will certainly be a flood of X rays and neutrons. I suspect that these might leave faint but discernible traces in the surrounding rocks.

So far, my discussion has followed precedent. I have considered a *continental* strike—one which hits a land target area. What has so far been overlooked is that three-quarters of the Earth's surface is *ocean.*

The odds are, therefore, three to one in favor of an ocean strike. For the 40+ known land craters, there must have been 120+ strikes at sea.

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It is *certain* that some of these marine falls equaled or exceeded the power of the Vredevoort impact. But the count does not end here.

For a start, the large majority of explored craters are in North America, just three per cent of the World's surface. There are several reasons for this: one is the comparative failure of attention to the subject elsewhere. Another is the Canadian Shield—the widest area anywhere of bare, primeval rock, where the craters of gigayears are easy to find. In any case, we must obviously multiply the number of known falls not by a factor of three, but by thirty. Hold the total down to a probable 1,000 falls in all—750 of them were at sea. There have been a sizable number of Vredevoorts in the ocean.

Your first thought will be that an ocean strike is just a damped-off edition of a fall on land. Not on your life! It's distinctly different. *and* distinctly more lethal!

Unfortunately, craters in water have a way of filling up and leaving no evidence on the surface, whatever happens to the ocean bed. We'll just have to manufacture a model by mental experiment; see where a few calculations from known facts will take us. Gauss was too lazy to reach out his arm for his log tables; to save himself trouble, he memorized the lot. We'll do the opposite and construct an asteroid whose vital statistics will make the figuring easy. Just a baby one. As we build it, we'll take a good look at it, for it won't have long to live. On then, to Vredevoort Mark II.

Four cubic kilometers will do for the size. This is just under one cubic mile: about 0.96 cubic miles to be more precise. Weight will be of the essence, so density will count. We will carve our experimental meteorite from a core fragment of planet Number Five. Pure iron, but for a trace of heavier metal which increases the density to the convenient value of eight times water. Every cubic centimeter of asteroid will weigh eight grams. I am encouraged in adopting this composition by Dr. Robert Dietz. He claims that the Sudbury nickel deposits are remnants of a slow nickel iron meteorite, which was also the origin of local deposits of heavy metals.

The shape is immaterial. Asteroids of this size are under no compulsion to be spherical, and the distribution of mass will not alter the impact energy. All the same, we'll take a good look at baby.

As carved out with tractor beams and superlasers the finished artifact is definitely a pill: a drum-shaped disk averaging a kilometer in thickness and three kilometers in diameter. The surface glints blackly evil, faceted and knobbly. Matching velocity to push it on course, we see that is spinning slowly. That notch on the rim will sight on Rigel in a few moments. We'll time the spin. Start the stop-clock now . . . 200 seconds.

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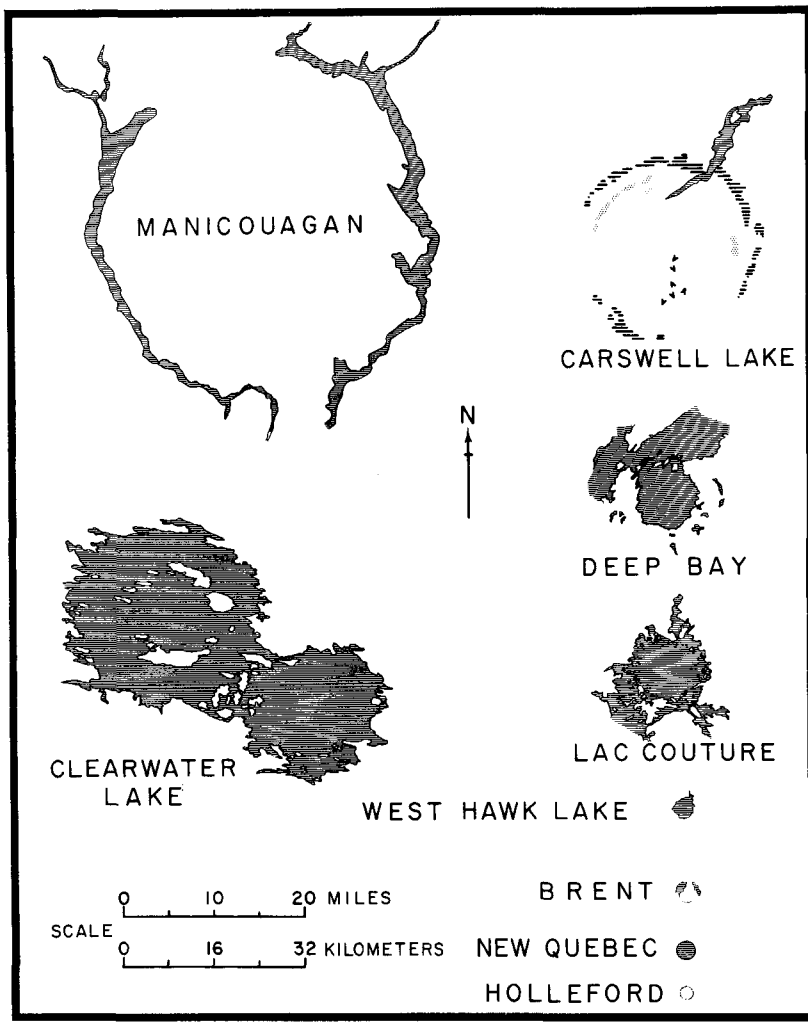

Dominion Observatory, Ottawa, Canada

Eighteen revs per hour. That's not very fast; the rim is only traveling at 100 m.p.h. But wrap that much rotation round a mass of tens of billions of tons, and you finish with quite a packet of angular momentum. Let's take a momentometer reading . . . the energy of spin comes out at 10^{23} ergs. Why, that equals about 2½ megatons of TNT! If any meteor scavenger thinks of looting this lump, he must first kill that rotation. He could do the job with his surplus Government. H1

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rocket engine, blasting for a month with about two million tons of propellant. It's hardly an economic proposition.

In fact, any landing whatsoever would be distinctly hazardous. At the rim, centrifugal acceleration is about a tenth Earth "G". At the pole, you might get away with a spacesuit landing; but even there, you must anchor a tether before going down. An electromagnet should hold, but as a confirmed belt-and-gallus man I would reinforce it with a gob of the latest plastic goo. The polar gravitation, little more than a quarter mile away from the center of gravity, is somewhat higher than one might guess. About one twelve-hundredth Earth normal. Fumble a tool as you draw it from your belt and it will only take a quarter minute to fall to the surface. Horrendous crash as spanner hits asteroid at five inches per second.

Speaking cosmically, Vredevoort II is a dust mote, but for all that we have mass with a capital M. Specific gravity 8, volume 4 cubic kilometers. The mass works out at $8 \times 4 \times (100{,}000)^3$ grams. 3.2×10^{16} grams. Over 35 thousand million tons.

It sounds, and is, a considerable hunk of matter, but Hermes, Eros, Icarus, all asteroids penetrating the inner Solar System as they orbit, are all distinctly larger.

We will steer the 35 billion ton missile into mid-ocean at 50 kilometers per second. Our observation eyrie will have to be well out and well to the side. There is no foretelling the speed and coherence at which the jet of plasma will gush up from the impact flare. Three or four thousand miles *may* be safety distance.

At the end of the countdown, a tremendous glare of sheer violet radiance—a color few have witnessed outside the high energy labs—lights the ocean for four hundred miles round the target, throwing the tiny clouds into vivid relief. It lasts only the space of two heartbeats, leaving us dazzled, far away as we are. That is not the impact—that is incandescent air! Air so compressed when Vredevoort II rushes through it on the last lap to the ground as to glow in the violet, and beyond. Luckily, we are not placed to hear the sonic boom which accompanies the glow; at closer range the sound is such as to pulverize bone and homogenize living tissue.

Before our eyes recover, there is another, more brilliant flare of violet. The plasma-bolt is rocketing up into space. Even at this range, it flames too brightly to be watched, brighter and hotter by far than the surface of the sun. Here is a concentration of naked energy verging into the nuclear range. We are seeing it by the lower frequencies; most of the radiation is beyond the visible spectrum. Before it disperses and cools, the jet of stripped atoms travels so fast and climbs so high,

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that it seems to stand upon the ocean hundreds of miles tall—an incandescent column, rainbow tipped and haloed. This is perhaps the illusion of persistence of vision, but its glare lights the entire ocean from continent to continent.

Below it, the fireball is expanding. First it is a blue-hot pinprick, then a dazzling sun-white speck, of perceptible breadth even before the plasma bolt has cooled to invisibility. It grows as a roiling, incandescent chaos, which even the eye of the imagination finds difficult to penetrate. In its lurid glare, we see a faint ripple expanding across the cloudscape. From our distance, it moves at a seeming snail's pace, though its real speed is little short of Mach 1.

Our mental experiment will take us little further; only calculation will clarify the processes which follow the flare.

Since $e = \frac{1}{2}\ mv^2$, every gram of the meteorite's mass will carry: $\frac{1}{2} \times 1 \times (5 \times 10^6)^2$ ergs. This works out to 1.25×10^{13} ergs per gram. Now multiply this by the total weight, 3.2×10^{16} grams. The total energy comes to 4×10^{29} ergs. This is very nearly *ten teratons, or ten million megatons of TNT*. (A megaton of TNT yields "only" 4.2×10^{22} ergs.) For comparison, the largest earthquakes which have been measured since Milne invented the seismograph developed less than 10^{27} ergs; this power was spread over very great volumes of the Earth's crust and mantle.

We could express the energy as heat. A calorie is the heat needed to raise the temperature of a gram of water by 1° C. It equals 42 million ergs. So our experimental strike is going to produce 10^{22} calories. There is power enough, and to spare. What other effects follow those violet flares?

To begin with, the enormous heat of the impact will not only vaporize the mile or two depth of ocean at the bull's eye, it will also vaporize the crystal rocks below, clear through the Moho, and blow out the surrounding rocks as well. Beyond the area where the mantle is laid bare, rifts will expose hot magma.

The crater is as wide as Vredevoort in South Africa. Though more power is absorbed in producing plasma at the kernel of the event than in a land strike—fearful energy is needed to convert water into a plasma of hydrogen and oxygen nuclei—water *is* less dense than rock. Despite its incompressibility and high latent heat of evaporation, it is easier to shift en masse than rock. So although the seabed crater is somewhat shallower than that on land, it is just as broad. A blazing wound scores of miles wide scars the sea floor.

A ringed waterfall as high as the Alleghenies rushes in to quench it, its circumference that of a county boundary. The fiery furnace opened by this strike will *not* glow for

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weeks and months as it would on land; the torrents of ocean rush in, and change at once to pure steam. They stream up in a thin-walled sleeve which is as clear as air, as invisible as the gush of super-heated vapor which flays the flesh from men's bones in a boiler-room catastrophe.

Here, the glass-clear gaseous water is sweeping up in volume enough to cloud a planet's atmosphere. The naked wound on the seabed glows white-hot through the wall of the frightful cylinder which encloses it. But inch by inch and foot by foot the waters sweeping in win. The column of steam still rushes up to the ionosphere, still spreads out across the heavens, but it steadily contracts. Beyond the rim of the inferno, crustal rifts are already exuding sills of lava across the ocean floor. Convulsions and seisms mount in cataclysmic fury surpassing the power of any natural quake.

All the waters of the oceans are set in oscillation. A mere volcanic eruption in the 1880s achieved this. Gigantic blast waves are ripping out far away from the crater. Dwindling in strength, they will circle the planet half a dozen times or more before they become indetectable. The turning world itself has quivered as it spins. Transfer of momentum will be small in a strike of this power. I'll neglect it.

The exact division of these different energies may not be clear. It will also fail to be of great influence on my argument. First, let us consider certain thermal effects of the strike.

Remember that the meteorite delivers about 3×10^5 calories per gram: just under 10^{22} calories in all.

I take it that energy dissipated in deep Earth tremors, splashed back to space by the plasma jet, or radiated back to space from the impact flare and the fireball, is compensated by the heat gained from the magma bared by crustal damage.

The energy absorbed in massive displacement of ocean water, in tidal waves, in blast, and in local damage to the seabed, will in the end degrade to heat. This will occur soon enough for the heat to give direct backing to the impact flare; it will work immediately behind the flare in evaporating the ocean. The continuity here is, as it were, measured on a *climatic* time scale. The watch dial is calibrated in hours and days, not the split seconds appropriate to the impact.

This being so, every unit weight of the meteorite will cause the evaporation of about 600 units weight of the ocean. It takes about 600 calories to evaporate a gram of water, on average. Not merely to raise it to boiling point, but to turn the whole gram into vapor. You need over five times more heat to free the molecules from the forces which bind them together in the liquid state than to raise ice to the boiling point. But the evaporation can take

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place *without* raising the water's temperature at all; as when the ocean turns into rain clouds. My figure of 600 calories averages the heat transfer in the two cases, both of which will occur in our meteorite incident. The calculation runs like this: 3 x 10^5 calories heat available per gram of meteorite ÷ 600 calories to evaporate one gram of water = 500 grams of water evaporated.

But every cubic centimeter of our meteorite weighs as much as eight cubic centimeters of water. This means that 4,000 *volumes* of water will be evaporated by each unit volume of meteorite. *The four cubic kilometer volume of Vredevoort Mark II will evaporate 16,000 cubic kilometers of ocean.* This is about 3,800 cubic miles!

You will obviously refuse to believe these figures, so let's check the calculations by another route. The total heat equivalent of the strike energy is 10^{22} calories. Dividing this by 600 calories per cubic centimeter evaporated, we get 1.6 x 10^{19} cc.—16,000 cubic kilometers again. Now normal evaporation from all the oceans of the Earth by the sun's heat is just *under* a cubic kilometer per minute—rather less than a billion metric tons; sixty cubic kilometers per hour.

The meteorite equals the sun's work as a cloud maker for 16,000 ÷ 60 = 266 hours, just over eleven days. This is just enough to provide an average rainfall of over one and a quarter inches upon the whole Earth, oceans and land together.

By itself, this would be a foul enough stormfall. Of course, in the nature of things, the rainfall would be anything but evenly distributed. You can make your own guesses at where the peak precipitations would occur and what their value would be. But the matter would be very far from closed by a single deluge of rain spreading across the planet.

When water vapor turns into rain, all those calories which were used in evaporating it are released to go to work elsewhere. This is the energy cycle which keeps a hurricane spinning; this is the force which lifts the cu-nim thunderhead higher than Everest. *For a while* the latent heat of evaporation is employed in moving air—wind-making.

Choose your own velocities for the winds generated by meteorite rainstorms. But don't imagine they will be gentle zephyrs. They will be very fierce and will rage across the world.

However, even this is not the crucial point in this question of release of latent heat. The crux is this: though the heat of the strike will in the end radiate back to space, radiation under constant cloud cover at biological temperatures is a fairly slow business. The following cycle will continue for some time before all the excess heat leaks off the Earth:

Heat absorbed by evaporation

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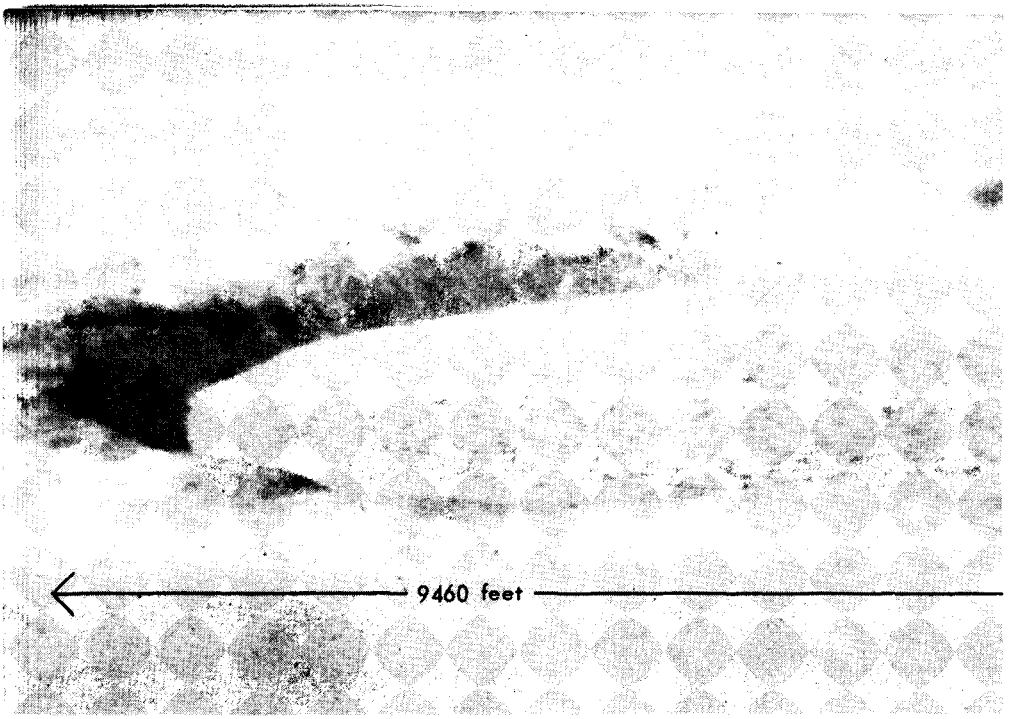

Condensation
Release of latent heat for further evaporation

Long range weather forecast: Very wet, very windy, very cloudy. Period of forecast indefinite.

As if this were insufficient, another factor comes into play to reinforce the overall effect of the heat cycle: let me explain it.

In the year 1883, the volcano Krakatoa blew its top. I will refer again to this event in another connection, to make another standard comparison.

"Blew its top" is an all too literal statement. The detonation pulverized several cubic miles of the volcanic cone. Where this originally peaked at a 3,000 foot summit, the ocean now rolls over part of the base. The explosion was a mere volcanic incident—two or three megatons of TNT would do as much; the energy released was only 7×10^{22} ergs.

A respectable proportion of the rock was shattered so finely that it hung twenty miles high in the stratosphere throughout the following decade. Doubtless some of it is still there.

There were noticeable effects. For the next ten years, sunsets and dawns were gaudier than usual the whole world over. It is said that over the same period, worldwide temperatures were very slightly lower than average.

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Dominion Observatory, Ottawa, Canada

Aerial view of the New Quebec Crater looking northeast from a height of 2,000 feet, March 1961.

Our model strike carries nearly six million times the energy released by Krakatoa.

The amount of solids thrown up by the meteorite will not be in the same ratio. They may, in fact, only be five or six thousand times as much as the pulverized volcanic cone. At first sight, the ratio of solids displaced may be thought to settle the amount of dust which is raised. This, however, is not the case. What will count is the minuteness with which the material is divided. A ridiculously small quantity of finely divided titanium oxide set free from naval smoke-floats will screen a naval task force from view.

Here the very high brisance of the meteorite explosion comes into play. Even a Barringer-size strike leaves rock flour on the crater floor. Much of what is blasted out must be finer still. (Did you see the picture of the cloud of lunar dust raised by Lunik V?)

The fact that the strike is on the seabed will make little difference. Superheated steam blasts just as forcibly as other explosion gases. The steam jet cutting up to the ionosphere will scavenge all powder from the crater, and a great deal of ooze on the ocean bed miles from the crater will go up with it. Clearance will be more effective than in the

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case of the land-strike. Salt will be carried up by the steam jet, and will float as fine crystals on high. These will be joined by salt crystals which are residue of the sea water splashed across the heavens in bulk. There will also be a large contribution from microscopic particles of rock and metal which sublime from volatilized material. Even on the very moderate assumption that, erg for erg, Vredevoort II lifts only one per cent of the microscopic particles raised by Krakatoa, it will still throw up sixty thousand times as much fine powder.

Let's hack out an answer: Take a conservative ration of 100 cubic kilometers of rock powder, sublimed micro-droplets salt, and seabed ooze. Choose particles only a micron in size, or grind them down to size by blast or steam jet. Use multi-megaton blasts and steam jets and winds of tornado strength to scatter them across the stratosphere. The resultant haze teams up 200 particles thick over the entire surface. Every electron on the ground has 200 particles directly overhead. The aggregate thickness of the screen will only be a fifth of a millimeter: but did *you* ever read fine print through even one hundredth of an inch of granite?

As a result of the impact a persistent and effective dust cloud will veil the stratosphere. It will float there for a period in no wise shorter than the decade after Krakatoa. The Earth's albedo will be effectively increased. A perceptible decrease in the solar heat reaching the surface for at least ten years seems to be certain. Still speaking very literally, Vredevoort II puts Krakatoa in the shade.

The world's weather is quite delicately balanced on the solar constant, the value of solar radiation received at the surface in clear weather. This has changed in the past. There are graphs which match the Ice Age datings of the past megayear against the cumulative effect of such astronomical changes as rotation of the axes of the Earth's orbit, precession, and so on. The resultant changes in the solar constant calculated from these effects are small; but the two graphs match with broad fidelity. Small factors, then, affect the polar icecaps and other similar matters. Our dust-veil is going to keep the Earth colder for about ten years. This is certainly time enough for the polar ice caps to grow. Even when cloud-cover has long since dispersed and the dust-shroud has settled, this growth in the polar ice will leave the planetary albedo seriously increased; more of the sun's heat will be reflected back to space.

A long, long planetary cold spell is safely predictable, despite any comparisons which are made with the cloud-cover, dust-cover, or heaven-knows-what-cover shrouding Venus. (In passing, it seems that all was not well with the estimates of surface temperature made when

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Mariner flew by Venus. Oh well, sailors who make brief passes at the ladies often receive equivocal replies . . .)

At first sight, the mechanical effects of the strike may seem to concern the globigerina ooze and the fish which provide an involuntary bouillabaisse. Marine quakes and seisms would not appear to concern life on land. This view neglects the matter of Tsunamis.

Commonly miscalled a tidal wave, the tsunami is normally caused by a tremor in the ocean bed: a rise or settlement of a few inches, or a jerk along a fault of a few yards or so—the type of thing which causes an earthquake on land. But on one occasion at least, the tsunami has resulted from a volcanic detonation. Right first time—Krakatoa!

Whatever the cause, an oscillation of the ocean is generated. There is no mass transference of water. Characteristically, the vibration is of low amplitude but very long wavelength. The speed of waves at sea is determined by the wavelength which in its turn is affected by the depth of the ocean. Because of its very long wavelength, the tsunami moves very fast indeed. The low amplitude may make it imperceptible when it races past a mid-ocean vessel at four hundred fifty miles per hour. This does not prevent it from raising the purest kind of hell where it breaks on shore. Here it builds into a devastating breaker which may reach miles inland. Ocean-going vessels have been stranded miles from the beach. The Krakatoa tidal wave broke upon Indonesian coasts in rollers which reached heights well over a hundred feet. It was *visible* as far off as the Cape of Good Hope. It was clearly *detectable* in the English Channel. It was still just detectable after circling the world again.

The 4 x 10^{29} erg punch delivered by Vredevoort II is expected to create quite a ripple. Mass displacement of the water, submarine quakes, and the pressure wave through the ocean will all contribute to the tsunami. The energy which it temporarily absorbs before restoring it as heat is conjectural. A reasonable allotment would be about one-sixth of the total power account sheet.

This will give it a force of 7 x 10^{28} ergs, two orders of magnitude more powerful than the largest recorded earthquakes. As already mentioned, these were continental. They spread their effects through millions of cubic miles of crust and mantle. We just do not know what tsunamis they would have raised had they been shallow disturbances under the mid-ocean.

But we *do* know what the million-fold-weaker occurrence at Krakatoa achieved. Quite obviously, the volcano did not exert its total strength in raising the tidal wave. Even if we credit the tsunami with

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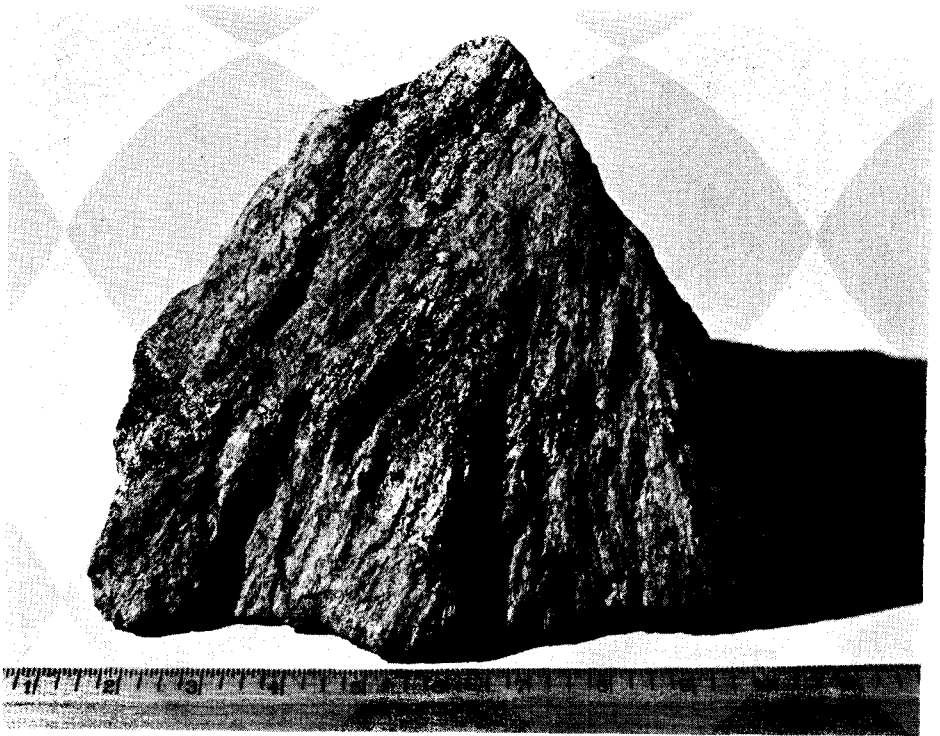

Dominion Observatory, Ottawa, Canada

Portion of large shatter cone in granitic gneiss from top of autochthone, northeast end of northern island, West Clearwater Lake.

all the 7 x 10^{22} ergs of the detonation, the meteorite tidal wave is a full millionfold stronger.

The tidal wave is a very efficient vehicle for transferring energy over long ranges. Frictional losses are fairly low, right up to the point where it climbs ashore to wreck the landscape. One sees it as an *area* rather than a *volume* phenomenon; roughly speaking, the third dimension is constant.

Let us, however, credit it with a decrement of distance cubed. This is conservative, being more appropriate to volume effects, like dynamite blasts in air. This decrement will make the meteoric tsunamis work at ranges the cube root of a million times those of the volcano: that is, at one hundred times the distance of the Krakatoa tidal wave. This gives it a global range in causing disaster. It will break at heights measured not in yards but in block-

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lengths on any shores in the middle distance, five hundred to one thousand miles away. Even at its antipodes it will wreak havoc comparable with that worked by Krakatoa at about one hundred miles range. Coastal belts all over the world—a sizable total area—will be in peril.

If the meteorite should fall within a confined ocean basin such as the Arctic, damage will recur. Before coming to rest, such a body of water will oscillate in a series of "seiches." The effect here depends on the natural frequency of the particular body of water. The series of waves would diminish in frequency—but the first few returns could all be catastrophic!

We had best abort the Vredevoort II mission while there is still time. Disintegrate that asteroid, Cadet Kinnison!

The ocean strike is clearly very different from the continental fall. The most vital distinction is this: the energy of the land strike is more violently localized and hence its destructive power is more carelessly squandered. On land, the enormous sessile fireball clings to the target surface, unable to rise because it runs out of atmosphere to rise in, even before it is fully expanded. Early in its career it is forced to spread out over the adjacent "craterscape," exposing a majority of its surface to space. So most of the heat radiates away from earth. A significant proportion of the total energy leaves the planet in this way. When the fireball has starved itself to extinction, the incandescent crater takes its turn in wasting energy in the same way over the weeks to come.

The marine fall works in a more efficient, synergic, cumulative manner. From the beginning its energy works with cruel economy. The radiation of the fireball is quenched and veiled and husbanded by steam and storm-wrack. Its heat is conveyed far and wide by the monstrous steam geyser. This also quenches and transfers the power of the ocean-floor inferno, and thus retains it on Earth. Rain follows rain, tidal waves recur, typhoons sweep again and again over a sunless world. In the districts swept by the tsunamis, the storms destroy the last chances of survival for all that grows or moves. The strike's power is transformed down to biological intensities, directed where it will harm the biosphere. When the hellpit on the seabed is doused, and when, weeks later, the storms have died, dust and cloud veil the Earth. The long Fimbul winter begins.

My picture is unexaggerated. We consider the release of energies equal to the detonation of one megaton bombs pitched down at five-mile intervals over the entire surface of the world. True, even the ocean strike will distribute its energy less evenly than this. It is, however, precisely my case that it will come nearer to so doing than the

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continental impact. Most of the power of this operates to overkill an already blasted region, a district the size of a nation, but still a limited area.

Above all, remember that what I have depicted *has occurred many times*. The craters of the Canadian Shield are probably a more reliable guide to the number and timing of past incidents than are those of North America as a whole. The Canadian Shield is a record sheet in stone; it has been ground clean, to receive the indelible and plainly legible account of more than two gigayears of meteoritic history. It is about a million square miles in area, roughly one half of one per cent of the world's surface. There are craters of moderate size and upward scattered across it. One of these, Manicouagan, is in the Vredevoort size range. I leave out the larger Natapoka Island Arc, well over one hundred miles in diameter, as well as Hudson's Bay itself. Five of these incidents seem to have occurred in the last five megacenturies, the post-Cambrian era; this is one every hundred million years on average. Multiply this by the ratio of size between the Shield area and the whole world; we then obtain the figure of two fair-sized strikes per megayear somewhere or other upon Earth. Events of Vredevoort strength will be distinctly more rare —perhaps one every five megayears—but the majority of these will happen at sea. When is the next due? Equally to the point, when did the last occur?

Here we owe a pertinent question to Mr. J. W. Campbell. It is my recollection that some years ago he posed the enigma of the Mammoths, whose frozen carcasses house undigested stomach contents. This is very puzzling indeed. The carcasses of Blue Whales are sometimes left unflensed in the cold Antarctic Ocean for just a few hours too long. When this delay occurs, the Whale's flesh is quite literally roasted within the insulating blubber by the heat of its own putrefaction. Some whaling men acquire a taste for the gamey dish. For a distinctly smaller beast such as a Mammoth, the effect would be retarded by the operation of square/cube law. But it should still have its parallel. The well insulated stomach contents should so ferment as to become unrecognizable.

Yet Mammoth carcasses are found in both Siberia and Alaska—lying in frozen jumbles of muck and tree-trunks in the permafrost—their stomach contents undigested and unfermented. I am told that on one stretch of the Alaska Highway the bulldozer drivers who cut the roadbed were forced to work in gas masks. They turned up so many carcasses of various beasties, that when these were exposed to normal day temperatures the whole area stank like an uncleared battlefield.

The situation presents other puzzles. Trees simply cannot grow in

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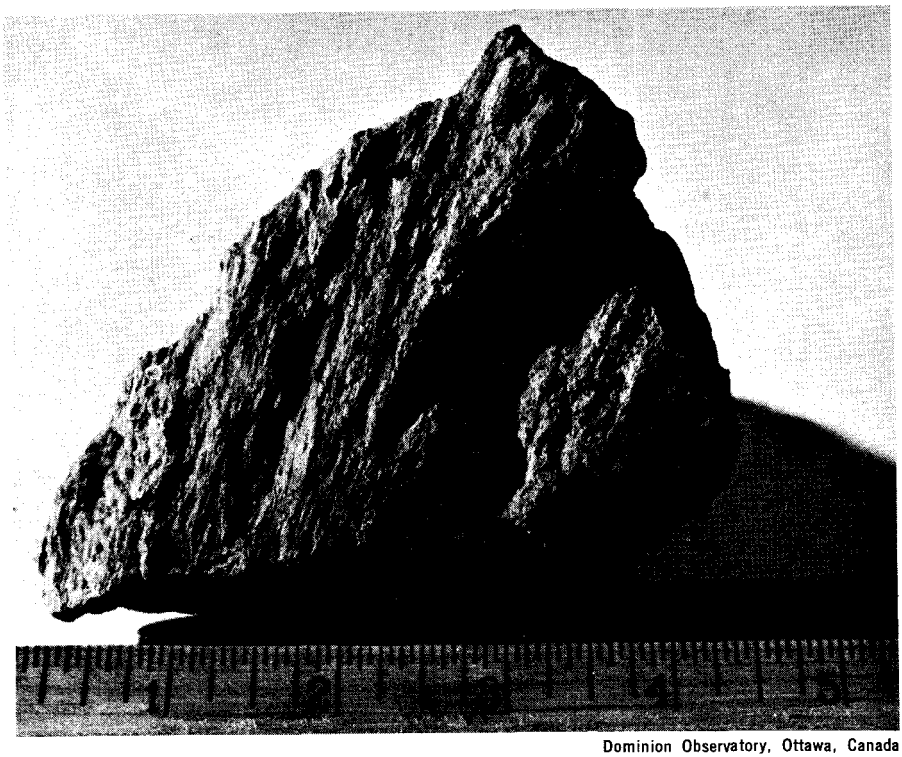

Dominion Observatory, Ottawa, Canada

Specimen of shocked gneiss from an outcrop near center of the Carswell Lake structure—not radiating and striated surface, characteristic of shatter cones.

the permafrost. The vegetation with which the bodies are mixed belongs to zones several hundred miles nearer the Equator.

Nor have I ever been prepossessed with the notion that the Mammoth wore hair to keep warm. Present surviving representatives of its family run their metabolisms at only three per cent the rate of smaller Mammals. Their idea here is to avoid an unseemly, messy end in an explosion of metabolic steam. Square/cube law again. Had the Mammoth needed to keep warm, there would have been no need to evolve a coat of hair: a slight lift to the thermostat setting would suffice. Come to it, how does a beast the size of an elephant find enough browse on the tundra? Would even the Taiga sustain him? Do we know any animal bigger than a rodent which grazes pine needles? Picture

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the tundral Mammoth, which, having picked its daily half ton of whortleberries one by one, goes on to gather a bed of moss. He must have this if he is not to sink through the ooze to the permafrost and wake up with rheumatism.

The fact is that I will be unsurprised to learn that there *was* a calamitous change in climate that "coincided" with a catastrophe which "just happened" to arrive at the time of the demise of the Mammoths.

Our old friend Sprague de Camp has expressed great skepticism on this point. When Cosmic Catastrophe and Calamity is mooted as an easy answer to an enigma, I, too, am skeptical. Like the Missourian, I want the evidence in my hand to clinch the proof.

An ocean meteorite strike *could* be the explanation here. Two of them if you like. Asteroids sometimes "twin"; the Clearwater Lakes in Canada, one thirty and the other twenty kilometers across, resulted from a double strike. The question is not whether it *could* have been the cause but whether it *was*.

Answers to the following questions could resolve the matter:

1. What is the altitude above sea level and the proximity to the sea or otherwise of known finds of Mammoth carcasses? *Carcasses* if you please. Dry bones will be irrelevant. We know that the prototype carcass was found *at the mouth* of the River Lena in Siberia, on the shores of the Arctic Ocean.

2. *Precisely* what vegetation and what its habitat is found within the corpuses delicti? Exactly what kinds of trees were jumbled with them in the permafrost, and what type of force is required to shear or uproot such trees like jackstraws?

3. Deep borings have been made in the ice caps of the Antarctic and Greenland. Have any surprises yet been provided by the counts and analyses of particles in any limited section of the drilled cores? What should be sought here is this: concentrations of rock dust and of spherules of sublimed rock and iron. These may total a depth of only a hundredth of an inch, perhaps a little less, in a core representing a decade's accumulation of ice. The iron particles would, of course, be magnetically separable from the ice-melt. The contaminated lengths as a whole might be separable from the column of cores on a conveyor belt basis, by optical methods.

4. There are known to be circularities on otherwise level and featureless ocean floors. What are the profiles of these, and can their ages be assessed?

5. Are there any widespread anomalies in the stratigraphical record of large coastal belts which are inexplicable by normal erosive and isostatic process?

You may well add questions to the list above. Significant contributions will foster the baby science of meteoritics. ■

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Operation Malacca | Joe Poyer

This story is—as of January 1, 1966, that is—science fiction. However, the efforts to communicate with porpoises are underway. And the hydrodynamic analysis in the story is believed to be accurate. The politics, on the other hand, is neither computable nor predictable.

I

"You are Dr. Mortimer Keilty?"

Keilty looked up from the scattering of papers and books on the table that served him for a desk. His eyes refused to focus for a moment and he rubbed the back of a dirty, sunburned hand across his forehead.

"Dr. Keilty?" the naval officer standing in front of him repeated impatiently.

Keilty reached over and shut off the tape recorder. The empty reel which had been spinning for almost an hour, stopped its subdued clatter. He sat back down heavily and regarded the officer across from him with a mixture of bleary-eyed distaste and absolutely no curiosity whatsoever.

"What the devil do you want?" he said mildly.

The naval officer, startled, shifted uncomfortably. He tossed his credentials' case onto the table so that it fell open to his I.D. card—a practiced gesture he was proud of.

"Hell, James Bond couldn't have done that better," Keilty said reaching for the case. The other flushed angrily.

"Lieutenant commander Michael Redgrave, Bureau of Naval Intelligence," Keilty read slowly, then tossed the case back. "So?"

"My instructions are to discuss with you something of the utmost importance to the security of the United States," Redgrave answered seriously.

"That's nice. Now get the hell out of here so I can get back to my

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work." Keilty picked up the pencil stub and began correcting a much-edited, dog-eared manuscript.

Redgrave shifted from foot to foot and looked around the cluttered room for a chair. Finding none, he perched on the edge of the rickety table. Keilty looked up.

"Perhaps you didn't hear me. I'll . . ."

"Beat it," Keilty said, and went back to the manuscript.

"Now look here," Redgrave exploded, "either you listen to me or I'll . . ."

"Shall I throw you out in tiny pieces, or will one pulpy lump do?" Keilty stood up and started around the table. He was almost six-two, and weighed well over two hundred pounds. Redgrave looked at the massive bare chest and sunburned expanse of shoulders and retreated backwards to the door.

"Lanahan, O'Malley," he shouted. "Get in here."

The door opened and two Shore Patrolmen, with rather ugly black service automatics in their hands stepped through, the automatics aimed at Keilty's midsection. Forty-five caliber, standard navy Colt side arm, Keilty decided, and my, didn't they look purposeful. Bet they could clean up a barroom brawl or a crap game faster than any squadron of Marines.

Lanahan, a thickset, muscular individual with a crusty red scar running from ear to ear by way of the bridge of his nose, made the mistake of stepping around Redgrave, so that Redgrave was between him and Keilty for a brief moment. A lesser man would have ignored the unintended challenge. But not Keilty. He stepped quickly to the left, his right forearm sweeping Commander Redgrave up under the chin and catapulting him back into O'Malley. Lanahan, he caught round the gun wrist with his left hand and reversed him into a hammer lock, then onto the two sitting on the floor. From there, it was a simple matter to confiscate both weapons and deposit the three sailors in the middle of the gravel path leading to the bungalow.

Keilty went happily back to his manuscript and the window that opened onto the blue and green reaches of the quiet Caribbean.

It didn't take long for the U.S. Navy to return. Keilty's mildly alcoholic fog was punctured by the rasping quality of his name shouted over a bull horn.

He went out, blinking in the late afternoon sunshine. Some one hundred yards offshore stood a Coast Guard launch. Redgrave, looking very unhappy, stood next to a rear admiral on the forward deck. Keilty noted that, although no one stood particularly near the deck gun, its canvas cover was unlashed and folded neatly on the deck forward of the mount, and that a two-foot magazine stuck out of the left side.

Keilty sauntered down to the

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Illustrated by Leo Summers

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beach and sat down on the edge of the grass, out of the sun. He raised the half empty pint of London Dry and toasted the cutter.

"You are Dr. Keilty?" the admiral shouted at him.

"Sounds familiar enough," he yelled back, "go on."

"Dr. Keilty, I am Admiral Rawingson, Navy Department, Washington. We have something very important to discuss with you. May we come ashore?"

"Nope, say what you have to say then beat it."

"Dr. Keilty," the admiral shouted again, "this matter is very confidential." He looked round at the grinning coastguardsmen, with the senior services' disdain for amateurs. Keilty considered for a moment; he shook out a cigarette and crumpled the empty pack, making a great show of his deliberation. The admiral respected it. Half a cigarette later, he took it out of his mouth and waved.

"Hi, Jack. How are the kids?"

"Great. How's your article coming?"

The admiral swung around and stared at the coast guard lieutenant on the bridge. Before he could say anything, Keilty howled, "Bring 'em ashore, Jack. Tie up at the dock, so they won't get their white bucks wet."

The muted idling of the launch increased as it swung round for the dock. Jack Weston brought it alongside smartly, aft of Keilty's 24′ overnighter. Keilty took the bowline and snubbed it down.

The two naval officers jumped down on the dock while Keilty ignored them. Clapping Weston on the back, he led the way up to the patio.

"Sit down, gentlemen, sit down." Keilty folded into a chair and shouted, "Margaritta."

A lithe, dusky skinned brunette appeared, wearing a very brief bikini. She stopped beside Keilty's chair, and ran a long finger over his ear. Redgrave flushed, Rawingson softened.

"Glad to see you at least put the top on for our visitors."

"Hm-m-m," she said. "Hello, Jackie, how are you?" She had a dusky voice to match her skin.

"Margaritta, this is Lieutenant commander Michael Redgrave and Rear Admiral Rawingson, I, uh . . . didn't catch your first name, Admiral?"

"Uh, it's Peter."

"Fine, Peter, Pete Rawingson, Margaritta. We're very informal here, Admiral, first-name basis only," he explained.

"How do you do, gentlemen," Margaritta murmured again.

Redgrave managed to get out a strang'ed sound while Rawingson stood and reached across the table to shake hands. Margaritta let her fingers slip slowly across his palm. Rawingson sat down looking much happier.

"Rustle up something to drink,

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Sexy," Keilty said. When she disappeared inside, Keilty laughed.

"She's a friend—out visiting for a while."

Redgrave let out a long unsteady breath.

"Dr. Keilty," Rawingson interrupted, "this is all very interesting, but we have something extremely important to discuss with you."

"Tough."

Rawingson looked pained. "I realize that the Navy has treated you pretty shabbily in the past, but we are prepared to let bygones be bygones."

Keilty exploded with laughter. "You're prepared. Hell, that's great. I'm forgiven." He leaned across the table and growled, "What makes you think it works both ways? You birds kept me going for two years on a project with nothing but a lousy letter of commitment, then decided not to sign the contract after all. Instead, you gave me my walking papers, classified my work, rescinded my classification, and kept my reports. Two years of work for absolutely nothing."

To fill the sudden silence, Redgrave said brightly, "Well, ah, we did pay your expenses." Keilty regarded him in such a way as to make Redgrave look 'round unconsciously for a hole to crawl into.

"According to the letter it was supposed to be a cost-plus-incentive fee. I not only lost my shirt, but I didn't even make a profit. For crying out loud, I'm a Capitalist. I work for profit. You ask me to work for you, you better pay me. That's why I pay you to protect me from our Socialist friends across the sea."

Keilty subsided and Margaritta reappeared from the kitchen, balancing the tray easily against the roll of her hips. She served the drinks and then started to fold gracefully to the grass alongside Keilty. He caught her on the way down.

"Beat it, Beautiful, men-talk. Give Jack's sailors a treat. Go for a swim off the pier."

"Nothing doing," Weston shouted after her. "You stay away from there."

"Dr. Keilty," Redgrave began.

"Shut up, idiot," Rawingson said. "If you had read the report I sent down to you, we wouldn't have this mess now."

"But sir, I . . ."

"Will you shut up," Rawingson said savagely, then turned to Keilty and in a milder tone, said, "Look, Doctor, I know you are upset about what happened before. But I am here to see that it doesn't happen again. If we could talk to you *alone* for a few minutes, I am sure you will see the significance of what I have to say." He glared meaningfully at Weston. The coastguardsman started to rise.

"Sit down, Jack. He stays," Keilty said to Rawingson. "He's a

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good friend, and besides, I want a witness."

Rawingson frowned. "What's your clearance, Lieutenant?"

"Top Secret."

"Well . . . all right. Remember it."

Rawingson put his briefcase on the table and opened it. From the pier, long drawn out wolf whistles and a faint splash sounded.

"She did it," Weston groaned.

Keilty grinned. Rawingson spread out an extremely detailed map. Keilty did not recognize it at once.

"This is a chart of the Strait of Malacca—Sumatra to the south, Malaysia north." Rawingson pointed out Kuala Lumpur and Singapore. "I don't have to emphasize to you the importance to world trade—particularly western trade—of this Strait. Four major shipping lanes, and numerous smaller ones pass up these Straits from the South China Sea, the Indian Ocean, and the Bay of Bengal." He paused to see if this had sunk in. Keilty was staring at the map. Weston was hunched in deep concentration.

"If," Rawingson continued, "this Strait were closed to us, it would be a severe blow to our prestige and influence in the Far East."

"Us, means us and Britain, I suppose?"

"Yes, Doctor, it does, but . . ."

"I thought the British were patrolling this area with enough naval power to wipe it off the map?"

"They are, but, in this matter they have asked our help, since it also concerns us. Let me finish setting the stage."

"Be my guest." Keilty looked mournfully at his drink, then picked up the admiral's untouched glass.

"If, as I said, we should find this Strait is closed to us, it would be costly beyond computation. We should have to detour our shipping nearly seven thousand miles 'round Australia from the Pacific, three thousand miles from the South China Sea through the Celebes, Coral, up into the Arafusa and Timor Seas and into the Indian Ocean. A delay of weeks and months. We would have to abandon our economic and shipping influences in the Far East. And if that is the case, we would be finished in Southeast Asia. From the western approaches we would have to reverse the entire procedure.

"You see," the admiral said, obviously warming to his subject, "since the breakup of the Malaysian Federation three years ago, it has only been the importance of Singapore to the West and the presence of Britain's largest Far Eastern naval and air bases that have kept Singapore from becoming an Asian Cuba. Because of Britain's strong support for Prime Minister Lee Kuan Yew he has been able to keep the Red Chinese and the Indonesians at bay while still keeping the rest of Malaysia satisfied that Sin-

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gapore poses no threat to their well-being. No one thought he would ever be able to do that a couple of years ago, but he has.

"To do so, it has taken another hundred thousand British troops to man the bases in Singapore—something that is extremely hard on Britain. Altogether, they have one hundred fifty thousand men in Singapore at the two main bases, and the third smaller air base. This additional money coming in from Britain, in addition to sizable foreign aid from both Britain and the United States has been able to keep Singapore independent from Indonesia. The amount of trade—entrepot trade, which means roughly importing and handling—would be enough to tempt the devil himself. But rumbles are starting. Britain's big new naval base on the Australian mainland is now definitely committed to be built. But it will be another five years or so before it is operational on any kind of a scale approaching that of Singapore. But already the trade unions, et cetera, are beginning to make trouble. Britain keeps assuring Singapore that they will replace the bases with other means of income. How, no one knows, including, I suspect, the British Government itself.

"Now with Singapore seeing a good thing coming to an end and more extensive trading possibilities opening again in Malaya and Borneo, they went back into the Federation desperately. They are willing to make quite a number of concessions to make sure they are readmitted. They really did not want out in the first place. Naturally this means that the Leftist elements are going to stir up trouble. Because indications are that Malaysia will readmit Singapore, Indonesia is willing to take this gamble. They still feel that they can smash Malaysia—even though things did not work out quite as they expected back three years ago when the Federation broke up. But then, that was due to Britain's unexpectedly strong stand in Borneo. Sukarno did not get to first base in Sabah and Sarawak. Then he took the licking in the southern islands of the Philippines. Too much was too much and so he quieted down for a time. Too long it would seem; they got rid of him."

"So?"

"So?" The admiral looked nonplussed. "Don't you realize after what I have said just how important this area is?"

"No, frankly."

The admiral took off his hat and scratched his head for a moment, looking at his hat in mild surprise all the while as if he hadn't realized he was still wearing it.

"Look at it this way then," he continued. "In 1964, the year before the breakup, Malaysia did an import-export business in excess of eight hundred million dollars. The vast majority of this trade went through Singapore. And, as you can

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see on the map, Singapore is strategically situated at the head of the Strait. During the war, the Japanese tied us up good in the China Sea and the CBI by taking Singapore. With it, they were able to control the entire Indo-China Peninsula and what was then the Dutch East Indies. This gave them access to all of the rubber, oil, tin, et cetera in the area, materials we had depended on for years. Ask a Brazilian, he'll tell you about rubber. They were able to deprive us of these materials and use them themselves. It wasn't until we began to cut their supply lines into this area that we began to hurt them."

"Get to the point, Admiral. I know all that. It still remains that this area is British responsibility and they seem to be doing a pretty decent job as usual."

"Yes, well, unfortunately, the Strait is international waters. It is also the route by which Subandrio sends his guerrillas into Malaya. And the pace has been stepped up since Sukarno departed the scene in his hasty and fatal exit."

"I read the papers, too, Admiral. Indonesia and Red China are hand in hand. But the British are still taking care of the majority of the guerrillas, and those they miss are taken care of by their 'advisers'! And we are keeping the Reds busy in Vietnam and Thailand. So?"

"Just this. Three months ago, the Indonesians began a scientific research station about thirty-five miles south of the western coast of Sumatra, almost directly opposite Singapore. The station is located in the Ruiari Archipelago, and is shielded on the north, west, and south by several islands. It faces directly up the Strait. Since it is in Indonesian waters, the British have been refused entry or inspection. The Indonesians claim it is purely a scientific project to investigate the currents in the southern end of the straits. As you may know, the currents *are* very tricky."

Keilty nodded.

"British photo reconnaissance shows an honest-to-God research station there and nothing else."

"Nuts, since when has that bunch ever done any scientific research? They wouldn't know what the words mean."

"Precisely. In addition to photo reconnaissance, the British have also sent two submarines in. The first was warned away, the second chased out and damaged somewhat by destroyers. It was a nuclear sub."

Jack whistled. Keilty was looking interested now. The sound of splashing, whistling, and catcalls from the pier went unheeded.

"What about UDT?"

"They have sent in three divers to date. None of them have returned. It would appear that it is impossible to find out what they are doing."

Rawingson paused and regarded

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Keilty. "That's why they turned to us and we have come to you."

"Ho, ho, so that's it," Keilty exclaimed. "The light is beginning to dawn."

"I thought it would," Rawingson smiled. "We are well aware of the subsequent work you have been doing with dolphins since leaving, our, well . . . shall we say . . . employ."

"Let's not," Keilty muttered. "I take it, you are interested in Charlie?"

"Tricky ain't they," Jack grinned.

"Just a moment, Lieutenant . . ." Rawingson sputtered.

"All right, no internecine quarrels. But, I agree with Jack, Admiral."

"If half of what you claim about this dolphin is true, Doctor, he's just what we need," Redgrave said seriously.

Keilty stood up. "Admiral, can I clobber him again, or just refuse him drinks?"

"Shut up, Redgrave. One more word out of you and you'll be in charge of wild life on Johnson Island."

"But, I only meant . . ."

"Shut up," the Admiral roared. He turned back to Keilty, a serious, almost pleading look on his face.

"Look, Doctor, we need your help. This is serious."

"Me, or my dolphin? And besides, you still haven't told me what the problem is. For all I know, that is still an Indonesian Research Station."

"Yes, you're quite right. Please sit down." Rawingson reached into the briefcase and took out a sheaf of papers. "This," he said slowly "is a series of reports concerning the movement of certain high-ranking military personnel in the Indonesian armed forces. As you know they are all fairly new, occupying key positions vacated by most of the nationalist officers in the last purge. To a last man, they have all been trained in Peking." Rawingson paused before going on. "Both of you," he said looking from Keilty to Weston, "are to give me your word that you will not repeat a word of this to anyone. Very few people know of it, and that's the way we want it kept." He selected a slim manuscript with the green top-secret cover sheet of the U.S. Government and the maroon cover sheet of the British Government.

"In this report, gentlemen, is incontrovertible proof that Red China has turned over to the Indonesian government a five-megaton thermonuclear bomb."

"My, my," Keilty whistled, "how dey do spread."

"We have every reason to believe that bomb is being planted on the floor of the Malacca Strait."

"How good?"

"Extremely good. The President has directed us to cooperate in every way with the British."

Keilty and Weston exchanged long, sober looks. Margaritta came

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running lightly up the gravel path, fastening the top of her bikini. She disappeared into the bungalow, ignored by the four men.

"If that bomb is detonated, it will destroy the British fleet and send billions of tons of radioactive water over the Malay Peninsula. The Indonesians will have Singapore relatively unharmed and the commonwealth troops pushed right out of Malaya. The British will be presented with a *fait accompli,* we'll be in an intolerable position in Southeast Asia, and India, and the rest of the world will holler, then put up with it. Indonesia is too far away for the British to be able to conduct the all-out-war, without help, needed to regain Malaysia and the Straits. And we don't want a war in those islands because it would spread us too thin. We want it confined to the mainland."

"Looks like I called the wrong parties tricky," Weston grinned. "My apologies, Admiral."

"Not a very pretty picture, Admiral," Keilty said thoughtfully. "Allow me to fill in the rest of it. You want me to persuade Charlie to scout out this installation . . ."

"And find us a way to destroy it," Rawingson interrupted.

". . . And find *you* a way to destroy it. Quite a task for one silly fish."

"You mean, you don't think he can do it," Rawingson asked quickly.

Weston laughed, got up and went into the house for another bottle.

"Hell, there's no question but what he can do it," Keilty continued, "if . . ."

"If . . ."

"If I decide he should, and if I can explain it to him."

"If you decide he should? Man, this is no time for personal considerations. We need you."

"Well . . . that's settled," Keilty said watching narrowly as Jack returned and poured the rum into the glasses. He reached out and tipped the bottle, making it run out faster. Jack looked pained as he held it up and measured the level.

"I just wanted to make sure you were asking, not demanding."

"What did you mean by explaining it to him—who's him?"

"Charlie, for crying out loud, who else? Look, Admiral, maybe this will work and maybe it won't. Explaining things to a dolphin is a little bit different than briefing a bunch of wet-eared naval officers.

"For one thing, dolphins think differently than we do. They have no politics—so they have no concept of good or evil. Evil to them, or what can be translated for evil, is to them the concept of shark or killer whale—their natural enemies, and then not all sharks, only those who prey on dolphins.

"In addition, Charlie won't do everything I want him to—only what makes sense to him. And I am going to have one heck of a time trying to explain this."

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Rawingson took a long pull at the drink Weston had poured him.

"It's funny. We had expected a lot of difficulties, even to the dolphin not being able to do the job. But we never expected that the dolphin might altogether refuse."

"There may be one other difficulty. How extensive will this reconnaissance be?" Keilty asked.

Rawingson sat forward. "The British are ready to destroy this research station. The Indonesians know this, but are gambling they can finish before the British strike. Naturally, the British won't act until they have specific proof, enough proof to convince everyone else concerned. The Australians have had a lot of pressure put on them lately by Indonesia, and they are pretty leery of anything that might worsen relations. They, for one, want proof that this bomb is there and that it will cause the damage we suspect it will."

"You want a comprehensive survey then. What are you looking for?"

"That we don't know. How would you go about planting a bomb in a couple of hundred feet of water—a very precise bomb, intended to do a precise job. We have a specially designed underwater camera and radiation counter to use for this job. We'll strap it on the fish . . ."

"Not fish, Admiral, dolphins are mammals—and he may not take kindly to being loaded up with equipment."

"Well, in this matter, I'll defer to you, you know best."

"Well, well, will wonders never cease," Keilty muttered to himself.

"The problem remains, we must have that information, and there seems to be no other way to get it."

Keilty stood up. "Let's go ask Charlie what he thinks, the most he can do is say no."

The admiral winced, but followed, stumbling over Redgrave, who in his haste to make amends, botched the job of holding the admiral's chair. Keilty led them around the side of the bungalow, past a neat flagstone patio where Margarrita was sunning herself.

On the leeward side of the island, Keilty had constructed a shallow series of three pens—much like olympic-sized swimming pools—out of cyclone fencing. The pens were each marked off with colored files of nylon mesh curving to a common opening on the seaward side.

He stopped by the middle pen, while Jack walked over to a small shed that housed the generator. When he opened the metal hatch, the sound of a small Diesel motor could be heard faintly.

"Jack helps me with these experiments quite a bit," Keilty explained. "Charlie and the rest know him almost as well as me. Jack's a better scuba diver than I am, so he does most of the underwater work."

"Our reports did not say that he participated in your work," Raw-

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ingson said thoughtfully. "There seems to be quite a few holes in our intelligence," he finished, turning a baleful eye on Redgrave.

"All set," Jack called, and came trotting back.

Keilty bent down and reached into the water for a switch set flush with the plastic sides. A high-pitched squeak sounded, muffled by the water.

"That's the call," Keilty said. "It's a tape recording of my voice shouting 'Hey, Charlie,' over and over again, about four times normal speed. It goes through loudspeakers spaced around the island and out on the reef. If Charlie is anywhere around, he'll hear it and come on in."

"What happens if he doesn't hear it?"

"It'll keep playing until he does."

Keilty paused to stare out across the lagoon. A triangular dorsal fin with a thin wake curling up and around was heading into the pool, about a hundred yards from the opening.

"Better stand back, this is an old trick of his," Keilty called, stepping back. They could now see a black and white torpedo shape shoot unerringly into the mouth of the pool and race up the fifty-meter length between the red and green files of mesh. Ten feet from the edge of the pool, the dolphin slammed around in a flashing broadside that sprayed water over the edge of the pool and the watching men.

"I guess we didn't move back far enough," Keilty grinned sheepishly. Redgrave surveyed his soaking wet whites and splotched bucks with dismay.

The dolphin swam leisurely back to the wall and flipped the switch to cut off the underwater call. Then he backed off a few feet and heaved himself half out of the water and onto the sloping edge. Charlie surveyed the four men with his bright eyes, his short, stiff neck twisting from side to side. Keilty sat down next to him with his bare feet dangling into the cool water and thumped the dolphin one on the back of his head.

Charlie opened his mouth, revealing four rows of conical, very sharp teeth and issued a cross between a grunt and a whistle, while Keilty stood a small microphone in front of him, clipped an earphone into the dolphin's auditory hole, and fastened another microphone around his own neck. He plugged both microphones into a mixer and tuned it quickly.

"Charlie's microphone feeds through a transphonemator that breaks down his click and whistle speech into the proper pitches for direct translation into English equivalents. Dolphin speech is composed mostly of broad band clicks between two and four kilocycles per second. We taught Charlie to speak English more as a test of his intelligence than anything else. The

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dolphin language, which is quite similar to others of the order Cetacea—whales, et cetera—is also quite difficult to produce without the transphonemator. It's a simply structured language, a straightforward 'working' language with a small vocabulary of some three hundred different word symbols, each with a single meaning."

Keilty patted Charlie fondly on the head. "He's pretty intelligent. He not only learned to use the transphonemator to translate his language symbols—their meaning that is—into human terms, but he invented new dolphin words and added them to his vocabulary at a phenomenal rate.

"It would seem to me," Keilty went on, "that the whole key to effective and quick communication between man and dolphin is in the initial use of the transphonemator to come up with enough common symbols to give us a reference ground—a kind of Rosetta stone affair.

"Once he learned to speak to us so that his language made sense to us, we began to teach him to think in word symbols. Charlie describes it as a mixture of English and dolphinese, although neither is particularly suited to the thinking process in this form. His biggest problem, as you might suspect, was in English words that have more than one meaning, such as *hear, here.* So far, he's not come up with any great earth-shaking philosophies, but then he still isn't clear as to what abstract thinking is. He can reason quite well, but not so well where abstracts are concerned."

"Then you just reverse the translation process in order for the dolphin to understand you?" Rawingson asked.

"No, not at all, or at least not any more. Dolphins speak and hear about four times as fast as we do. This also translates to their movements and perceptions. Dolphins are extremely fast, as are all sea creatures. In the water they are extremely quick because they are essentially weightless and actually have three dimensions to move through, while we have only two—except by artificial means. So they have to be very perceptive and fast.

"Now, because they do hear and speak and because he now knows English, my voice is merely recorded and played back instantly, but four times faster than normal. I am gradually teaching him to understand me without the speed-up process, but it is like trying to understand a seventy-eight record at sixteen rpm. About six years ago, some scientists down in the Virgin Islands noticed that their dolphins were repeating a series of sounds over and over. When they taped and slowed them down, they found that the dolphins were actually saying the words in English, but four times as fast. They also found that these dolphins could understand

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some words they were saying. But, still it is a long way from isolated words to entire sentences and conversations four times as slow as you are used to.

"English is basically a sentence-oriented language—subject, verb, and modifiers for each as needed. On the other hand, a language such as French, where meaning depends on word variation, might be easier to teach a dolphin as their language is sound-symbol oriented and each sound means a specific thing, and there isn't the logical progression through a sentence as there is in English. Then again, I may be completely wrong. We will have to try it to find out.

"Charlie has become so good at using the transphonemator and has developed quite a sense of humor that you sometimes forget that it is a dolphin speaking to you. We've installed a television set and a microfilm reader that he can use . . ."

"You mean he can read?" Rawingson asked, amazed.

"Of course. Why not? From speaking a language, it's not so hard a step to breaking down the relatively simple code we use for writing. Anyway," Keilty continued, "he can use both whenever he wants. It's the same with a two-year-old. Allow him access to a television set and teach him to read at three and he will develop about twice as fast as a child who doesn't know how to read or doesn't watch television.

"Because of this, in two years, Charlie has developed quite a vocabulary and a fairly good grasp of abstracts for one who never even dreamed of their existence before. I'd say that his general level of intelligence is about on a par with a twelve-year-old."

Charlie had been fidgeting through Keilty's long dissertation and finally broke into the conversation, interrupting Redgrave who had been about to ask a question.

"What's up, Doc?" Charlie's voice was a well-modulated imitation of Keilty's. Both of the Naval officers started and stared at each other. Charlie slid back part way and slapped the surface with his tail.

Keilty looked pained. "Cut it, Charlie, this is serious business. These gentlemen are here to ask our help. They have come to us because you are the only one that can do what they want, so quit clowning around."

"O.K., sorry," Charlie replied, still in a creditable imitation of Keilty's voice.

Jack bent over to pat his head. Keilty then explained briefly what they would need from Charlie and that it would give him a chance to ride in an airplane again. They would even put him by the window for the entire trip this time. Keilty did not explain why they needed the information as it would only have confused the dolphin, or so he

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thought. He played up the airplane ride and the chance to see new territory.

The dolphin acquiesced easily enough, then demanded to know why.

"Oh, brother, you would have to ask that."

"Darned right. If you want me to go traipsing across the world, then you had better tell me why."

"Look, Charlie," Keilty said. "I've tried to explain to you before about the Red Chinese and the Russians against the West . . ."

"Yeah, with that cornball analogy of the dolphins versus the sharks," Charlie interrupted. "What it all amounts to is that each of you wants the other to think and act the way he does, right," Charlie finished smugly.

Keilty did a double take. "Now how the devil did you arrive at that conclusion? I've been trying to pound just that idea into your thick head for nearly a year."

"I've been sitting out on the reef thinking about it since last night's newscast. Eric Sevareid gave me the clue."

"Eric Sevareid?" Keilty cried.

"Yep, he was talking about religion."

"I give up." Keilty threw up his hands. "You see," he said turning to Rawingson, "why the scientific method isn't much help here. Our own informal way sometimes works best. This is what I tried to convince those idiots in Washington. But no, now everything has to be done by the book. You don't just build an engine to meet specifications any more, size, weight, thrust, et cetera. You build it the way the government wants it built—and they never know what they are talking about. Nuts!"

"All right," he said turning back to the dolphin, "now that you have figured that out, are you convinced that we are right, or do you still maintain . . ."

"So are they convinced they are right apparently," Charlie interrupted.

"So what? This is the side I live on," Keilty shouted.

"Yeah. But that doesn't alter anything."

Keilty sat back down beside the dolphin and scratched his leathery hide head while the dolphin blinked in contentment like a sleek, bullet-shaped cat.

"I know better than to argue philosophy with you," he said accusingly. "And so do you. We still have to build that frame of reference for abstractions and you know it."

The dolphin gave an almost human sigh and wriggled into a more comfortable position. Keilty dipped a bailing can full of water and poured it over the dolphin's exposed back.

"Hey, that feels good." Keilty continued to dip and pour. "Still, you haven't explained to me why you want me to do all this for you."

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Keilty paused a moment, marshaling his thoughts. "Remember a few weeks back when I explained to you about explosives?"

The dolphin thought for a moment, then brightened. He fastened his great eyes on Keilty. "Yes, I do. The expanding gases that tear things apart."

"How about nuclear explosives."

"What about them?"

"Well that's what my enemies intend to use. At sea, my friend. In the water. Boom. Dead fish all around. Poisoned water, et cetera."

"The fish don't bother me," Charlie said, rolling onto his left side for a better look at the two naval officers. "Who are these cats?"

Keilty motioned the two slightly thunderstruck naval officers to approach.

"This one is Rear Admiral Peter Rawingson and this other is Lieutenant commander Michael Redgrave. They are the people who need your help."

Charlie regarded them for a moment, his eyes clouding slightly.

"Pardon my not shaking hands, but I'm not equipped for it as you can see." He eyed Keilty again. "Let me think about it. I'll let you know."

Charlie slid back into the water, then poked his snout out. Keilty pushed the microphone closer. "You said I can look out the window?"

"That's right Charlie," Keilty soberly answered him.

Charlie rose half out of the water for a long half a minute. Keilty could almost see the blood churning through his brain as the dolphin decided.

"All right then, I will."

Charlie dove towards the center of the pool and disappeared out into the lagoon.

Rawingson let out his breath in one short gust. "That," he stated, "is the damndest thing I have ever seen. That crazy fish sounded and acted human."

"What's your definition of human, Admiral?" Jack asked, peering out toward the lagoon after the dolphin. "He thinks, he rationalizes, and he is emotional. What else do you need to be human? A soul? What's that?" Jack turned towards the others, standing near the pool in the gathering dusk. The offshore breeze that sprang up an hour before sunset had died away to nothing and the silence was nearly complete, broken only by the occasional call of an island bird. The sun had slipped beneath the western horizon to their backs and the light was fading fast in the brief tropical twilight. Already, in the east, single stars were glimmering fitfully. Jack shivered lightly and in a faraway voice said, "You know, gentlemen, Mort here and I have argued for months about this. But I still maintain that Charlie and his race are the first real contact with an alien life form we've ever knowingly had. They are so completely different

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from us in mental processes, that there is very little natural common ground. So don't be fooled by Charlie's apparent humanness. It's all learned."

The darkness grew and silence held the four men until Margaritta, padding up quietly behind on bare feet, softly announced dinner.

II

The dolphin swam strongly out into the lagoon, troubled by the two strange men he had just met and the information Keilty had given him. He clearly recalled every word and intonation of conversation concerning human relations that he had had with Keilty. He realized that Keilty was what humans called a rationalist. But beneath, and even more important, Keilty was an optimist. He had never clearly understood what optimism was until Jack had explained, using Keilty's relationship with Margaritta to put his point across. Even then it had taken some time for him to fully grasp this totally human idea. The terms, or temperamental outlook, of optimism, pessimism and cynicism, et cetera, are related to the time senses since they are all concerned with what might happen tomorrow. Until Charlie had been taught by Keilty what tomorrow meant, he had never considered the concept of time. Dolphins had and needed no concept of time.

Yesterday, today, and tomorrow were needless, one and the same. There were no passing seasons to stimulate them in the sea; no need to build shelters. Their home was the sea and the sea furnished them both food and shelter. If food became scarce, they went somewhere else where food was more plentiful. They were born, lived, and died in the sea. They had no religion because the sea supplied them with all they needed, hence they had no need of a promised land or a better tomorrow as all tomorrows were equally as good as today. The sea was bountiful. Keilty had once told Charlie that his race was either the most advanced or the most degenerate that he, Keilty, would ever encounter—and he was not sure which. Looking at it from Keilty's human standards, Charlie was not so sure either. But from the dolphin's point of view, he was sure that he was content—and probably degenerate.

So Charlie had to discover the idea of time. Jack suggested that he watch the sun and had given him a rudimentary counting system to use. Since that day, he had counted four-hundred and seventy-three periods of alternating daylight and darkness. They still meant nothing to him, but he could see somewhat the importance of time to humans. Mentally, he gave the equivalent of a human shrug.

He was very much troubled by what Keilty had asked him to do. And, as he had found himself com-

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ing to do more and more lately when he had a problem, he filled his lungs and sounded for the base of the reef. The water was cool and dark some seventy feet down and into one of the many empty overhangs, he could insert his body to satisfy his survival instincts. Any enemies had to approach from the front. He wriggled his bulk in and relaxed to think through the problem. First of all, before meeting Keilty he had never had a problem in his life. Dolphins lived by the old axiom "all things come to he who waits" without really realizing it. Then, he had learned that in the world of humans, there were such things as problems.

He had decided on the spur of the moment to involve himself in a human problem. He had always been reluctant to do this before. He stayed near Keilty because he was as curious as Keilty was. But now, why all of a sudden had he said yes? He had insufficient data to go on and basically, he could see no real differences in the two opposing sides. He did not understand the ideologies or ramifications involved for humans and he sensed that it would be better if he did not. His own kind were satisfied with their few problems and certainly did not wish human problems. Degeneracy again, he decided.

Perhaps it was Keilty—there was a compatibility between them that he did not recognize as friendship since that concept was alien also. He considered Keilty to be one of the herd in which he grew up—a part of the family so to speak. Keilty now wanted his help. If he did help it would make Keilty happy. He recognized that he had never been dependent on Keilty the way humans were dependent on each other. He had never been held captive, nor did Keilty feed him. He was free to come and go, and he did, as it pleased him and Keilty had never interfered.

Charlie was faced with a dilemma—not of deciding whether or not he would help because he had already told Keilty he would—but of resolving his own conflict; to become involved in a human problem. He could see the problems of taking sides with either faction, could see the factions factionating down through a series of images to infinity as if in parallel mirrors.

His justification of the course he had taken was honestly rationalized—mostly because, lacking the distinction between honesty and dishonesty, he choose this course because he wanted to help. And because he was rather curious. And now that he thought about it, he realized that Keilty had played on the right chord in offering him a chance to watch out the window of the airplane. He had flown once before and had been completely captivated by the process of flying. Another chance was too good to pass up. Perhaps he was not so honest after all, he decided. Then it came

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to him that he had a better understanding of honesty than Keilty thought he did, or he himself for that matter. It troubled him a little that perhaps he was becoming a bit too human.

III

Cold tropical rain pounded the decks and upperworks of the HMS *Bradley*, wallowing heavily in the stormy waters of the Straits of Malacca.

"Report says the rain will last another twenty-five minutes, sir." The rain-slickered executive officer recapped the speaking tube and turned to the captain.

"You chaps about ready?"

Keilty nodded to Rawingson. "We're about set, Admiral. Captain, can you swing this pogo stick into the wind when I give the signal, then cut your engines long enough for Charlie to get away?"

"Yes, I think so. Wouldn't do to cut up our spy now would it?"

Keilty swung down the ladder muttering to himself. Charlie was ensconced in his tank, fastened to the starboard bow just inside the railing, and looking very unhappy.

Keilty flipped on the transphonemator.

"This stuff chafes," was the first thing Charlie said. He didn't understand the deeper meanings of profanity but agreed with Keilty that for emphasis, it had no substitute.

"Knock off the griping. I gave you your chance when we were fitting it out," Keilty growled humorously.

"Maybe, but there's a big difference between just trying this junk on and actually wearing it." The dolphin was loaded around his shoulders with equipment to power and control the two television cameras mounted on either side of his head to give a stereo effect. They were encased in watertight rectangular and contoured plastic kits 18″ x 20″ x 3″. The equipment was slung around his shoulders in two pocketed belts that resembled oversized cartridge belts. A flex metal strip ran the length of his dorsal side from shoulders to tail to serve as an antenna.

Keilty peered over the spray-lashed side of the destroyer and came back to the tank. "It looks pretty rough down there. Do you think you can get into the water without any trouble?"

Charlie peered at the series of mirrors that angled over the side to give him a view of what was below. "Really kicking up a storm down there, isn't it." He contemplated for a moment. "When you're ready, drain the water out of the tank first. I don't want it twisting me around. Swing the board over and then dump. But, warn me first. That's a long way down."

"All right, we're ready." Keilty pulled out the stops in the bottom that drained the tank.

Charlie grunted as the supporting

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water ran out and he settled into a rather flaccid mess. With the help of two British sailors, Keilty wheeled the tank over to the railing, then pulled away the sides. Charlie now lay poised on a swivel board, half over the rail. With the microphones and tape recorders unplugged Keilty was unable to understand Charlie's high-pitched squeaks of complaint. He waited, grinning into the mirrors stroking the dolphin's flank to calm him, judging the depth of the waves. A few seconds later, the destroyer buried its bow into a deep wave that washed solid spray over them. The following wave was the one he had been waiting for. It built under the bow, lifting the ship over its crest, then slid past as the bow sliced down, cleaving the water in two churning furrows, down into the trough. As they crested again, Keilty waved his arm vigorously to port and the coxswain on the bridge peering at him through the revolving screen, turned the destroyer into the beginning of an S curve. The bow plowed through the furrow into the next wave and Keilty slapped Charlie on the side and upended the board. The dolphin gave a powerful kick with his tail and shot clear into a long curving arc that carried him away from the destroyer's side. He disappeared into the boiling green water less than six feet below, with hardly a splash and sounded desperately.

The coxswain swung the helm back, sluing away from the spot where Charlie had disappeared and bringing the thrashing propellers clear of the furiously swimming dolphin.

Keilty straightened up from where he had been leaning over the rail and glanced at the two ratings. "Thanks, fellows," he said briefly, grinning at both, and made his way across the heaving deck and up onto the bridge, suddenly apprehensive of what he had done.

Charlie swam strongly below the turbulent wake created by the ship. Five minutes out from the point of his entry, he began swimming aimlessly as Keilty had instructed him to do. If the Indonesians had spotted the ship, they would surely be listening in on sonar for more underwater trespassers, and would have spotted the dolphin leaving the ship. From there, his cover would be good if he could find and blend in with a school of good sized fish. Keilty had once explained to Charlie how sonar worked, but Charlie had been way ahead of him—had in fact been amazed at the limitations of the human device.

After an hour he began swimming in the general direction of the Indonesian research station. He had safely left the storm area that had carried on north on the prevailing winds. The sun was shining strongly enough on the surface to light quite clearly the thirty-foot or so depth he was swimming at. The waters tasted and smelled different

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to Charlie. This was the first time he had ever been away from the waters that he knew around the Keys. He was not afraid, since fear was an alien abstraction to him. What he felt was more an extension, a heightening of his senses that put him on edge, doubly alert—a feeling he had felt before when his few natural enemies were in the neighborhood, sharks, and once a killer whale that he had identified from the descriptions once given him by elders. He was nervous, but since this feeling had never been described to him by humans, he did not recognize it as a human feeling.

Charlie swam on, from time to time noticing strange fish with which he was not acquainted. Other than that, it seemed to him much like swimming in the open ocean at home. The water was delightfully warm and he swam happily, beginning to lose his nervousness as he became used to the new surroundings. About an hour after leaving the ship, he began to pick up the scent of man and seconds later his own variety of sonar showed a large bulky—or series of bulky objects dead ahead.

As he swam closer he began to make out the image of some type of strandlike obstruction reaching to near the surface. When he sounded for air, he was only some ten feet from the buoyed net. He swam up and nudged it playfully. Nothing happened. The bright yellow buoys fastened all along the top bobbed erratically, but the net remained in place. Keilty had described the netting to him and told him he could expect to run into some type of it. Charlie swam back and forth along the netting for a way, then sounded, swimming down along the net to see how deep it went. The mesh was quite fine, about a half inch wide and beyond was another, thicker net made of steel cables.

Charlie swam back to the surface to consider for a moment. He picked up the sound of a boat's propellers moving through the water quite fast. Above him, the mirror image of the underside of the surface was broken quite suddenly by a V-shaped trail and a turbulent wake as a twenty-foot patrol boat passed over him.

Charlie swam quickly to the surface, careful to keep the equipment strapped to him out of sight as much as possible. He was beginning to think this was all rather ridiculous and not in keeping with his fine sense of dolphin propriety, but Keilty had warned him to be careful.

He chased after the patrol boat, slapped the surface with his tail to attract their attention, then showed his dorsal fin. The boat rounded on him in a sweeping turn and came back under full power. Charlie dived and stayed below the surface out of their sight. Apparently they were satisfied that it was only a fish that had disturbed the net as they roared off towards the research station some three thousand yards

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away. Charlie listened to the sound of the propellers disappearing in the distance, then swam back to the net. He was careful not to touch it this time.

When the net was before him, he cruised slowly along, ascending at the same time until he was again at the surface. The top was flush with the surface and there was about twice his length between it and the next presumably charged fence, according to what Keilty had told him. He considered the distance, then backed off and shot forward into the air over both nets at once. He caused a loud smack as he splashed back into the water, but surfacing again to look around, he could not see that it had tripped any alarms or alerted anyone. He wondered briefly what alarms were as he cruised around the surface. Keilty had said that he should avoid them, but had neglected to tell him what they were. With his beak out of the water, he cleared his lungs through his blowhole, then refilled them to capacity with fresh air. Sighting on the station lying across the oily sea from him in the tropical afternoon, he sounded as deeply as he dared and swam forward. He was not too sure of the distance because out of the water, appearances were still deceptive to him, but he surged forward at close to twenty-five knots.

Shortly, a long thick column appeared in front of him and he braked with his tail, swerving at the same time to avoid hitting it. The water seemed to be quite thick he noticed, and full of refuse that hampered his vision. He swam between the columns, around a second and a third until he emerged from the other side. Turning to his left, he swam out of the refuse laden water and switched on his cameras. Immediately he received a pulse close to his ear, that told him the humans were aware that he activated his equipment. He swam slowly forward until a large pillar again appeared. The water was much heavier here with a nauseating taste to it, and the current so slow that he was barely able to detect it. He was directly in front of the pillar, some forty feet away. He waited for the double pulse that would mean that Keilty was seeing what he saw. It did not come. He swam closer, cutting the distance in half. Still no pulse. When he was less than ten feet away, the pulse came suddenly.

Now he began to swim even more slowly, letting himself rise up the pillar until he nudged something above him. He backed away to investigate and saw that it was some kind of barnacle encrusted shelf. Then he saw that the pillar fitted neatly into the center of the shelf. Something glistening attracted his attention to the leg and he moved over to investigate. As he watched, a glistening drop broke away and formed a bubble which shot towards the surface. When the

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next one detached itself, he snapped at it with his beak and immediately his mouth was filled with a thick cloying taste that burned. Violently, he expelled all the stored air in his lungs and rushed for the surface. He broke water in a jump that carried him half out of the water, shaking his head from side to side. He drew in deep draughts of water sloshing it from side to side until he was able to clear some of the taste out of his mouth. It did not burn so badly now, and he lay quietly on the surface, shuddering through his entire length, fighting to regain his breath. He did not know exactly what it was that he had tasted, but it was a much higher concentration of the oily water around him—lubricating oil to keep sea life from encrusting the retractable legs of the sea tower.

Three quick pulses were repeated over and over. Keilty was sending a query, puzzled as to why the transmission had broken off. Charlie pulled himself together, and began swimming slowly. It was quite dark where he was, although a ring of bright sunlight showed all around. He deduced that he was under whatever the pillars were holding up. Off to his right, a long shaft sunk straight down into the water, blocked the light from a small segment of the circle. Charlie swam to it and taking a deep breath, he began to swim down the column hesitatingly. The pulse came again to show that it was quite a bit thicker and was formed of segments rather than one continuous column. The column ended forty feet below the surface in a large bulbous structure some twenty feet across and looking like a flattened rubber ball.

There was a large hatch that he investigated, making sure that the camera picked up a good image of the hatch and its opening mechanism. He swam around the structure and then under it. Beneath was a heavy steel plate that flared upward, supplementing the steel spheroid structure. This steel plating was featureless, without even rivet holes which would have been meaningless to Charlie anyway.

The dolphin bumped at it with his nose, smelling the steel, but not tasting it. He had learned his lesson. He became aware of the chafing of the equipment belts around his shoulders in the form of a violent itch. To scratch it, he tried to rub his back against the plating. Suddenly, his ears were filled with an insistant chattering. At the same time, Keilty began sending excited pulses to stay where he was. Charlie held motionless, his back bumping against the plating while the chattering continued. Keilty pulsed the code that indicated to him that he was to swim slowly forward. As he did so, the chattering lessened in frequency.

He backed and turned in direction to the pulses until Keilty had him swimming slowly directly beneath and almost touching the flat-

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tened sphere. The chattering was continuous now.

Keilty directed him to get what pictures he could from beneath the structure after about fifteen minutes. By the time Charlie had finished, the sun was halfway below the horizon. In response to Keilty's signals, he surfaced cautiously some five hundred yards from the tower structure. The red sun painted the gray steel tower golden in the dwindling twilight. Charlie paused to breathe and then began swimming slowly toward the structure in a circling maneuver. The main deck of the tower was clearly lighted against the deepening blue of the eastern horizon. Lights were appearing on the tower and the superstructure of the drilling rig. The monotonous clanking of the drilling machinery served to cover the faint noises the dolphin made as he swam to within fifty feet of the tower and began to circle around it.

The figure of a man appeared briefly near the railing, clearly outlined against the dimming sky. He fumbled briefly near the railing and Charlie sounded, startled as floodlights bathed the area around the tower. Charlie's thoughts were strictly dolphinic as he rose again to the surface, this time staying completely underwater. He began to swim away from the lighted area until the shadows were deep enough to surface. By now he was some eight hundred feet away from the station. He took a good look around, letting the camera pan over the scene. The tower was too far away to detect details and his sonar told him that there were several surface craft making random search patterns around the station.

Charlie let himself settle until he was about a hundred feet below the surface and then began extending his sonar field. His maximum range was some ten miles or so, although he was not aware of the distance in human terms.

The station itself commanded most of his immediate field to the east, and to the west he could just barely make out the dimming echo of the *Bradley*. The sharply defined echoes and subechoes from the station said human to Charlie, as they were knife-edged and vibrating at the same time. He concentrated on the station, laying out its underwater pattern until he was sure where every underwater leg and support was. Then he began to examine the area beyond the tower—the islands rising sharply beyond, the slope of the channel bottom, and a small underwater ridge of rock that seemed to head in the general direction of the Strait. Except for the crosscurrents which he could detect, it was absolutely uninteresting. Nothing but volcanic sand bottom with a profusion of marine growth, except where the current was strong enough to thin it down.

Charlie narrowed his sonar field until it was pulsing outward in a

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forty-degree arc and started sweeping around in a broad circle. A clearer, tighter picture began to build up; the island sloping away into a narrow channel, then rising to another island. The whole area appeared to Charlie to be a series of tortuous underwater channels. The bases of several more distant islands were visible. Charlie pivoted slowly until he was able to fan the sonar beam over an open area of channel between two islands that led away into the South China Sea.

A reflection appeared. At first Charlie thought it was a whale, then he noticed it was resting on the bottom. The object was near the limit of his capability. Keilty had said to get back as fast as possible so he could not waste what to Keilty would be time—too long a time—to take a closer look. He waited out the multiplicity of reflections until he was able to isolate the one he wanted. He really did not feel guilty about waiting because he knew that this much time would not make any difference to Keilty—at least he he hoped so.

There shimmering near the limits of his awareness was the peculiar echo and subecho of fabricated metal and that meant human beings. Charlie was puzzled. The object seemed to be resting less than a mile from the base of a large island. He watched it for a while, examining the blurred image as best he could until he had it as sharply defined as possible. Somehow he sensed that this intruder might have something to do with his mission.

Suddenly he remembered. He had seen a submarine once before in his home waters and had chased it for miles, wondering what it was, watching its strange antics as it twisted and dove as if to escape several ships cruising on the surface.

Now with his curiosity satisfied, the vague feeling of danger evaporated and Charlie completed his sonar sweep and surfaced again for a final look around. The sun had set and darkness had swiftly blanketed the area. He could see nothing of the tower now but the lights in the rigging and the floodlit expanse of water surrounding.

He breathed deeply to fill his lungs to capacity, dove and began to swim casually away from the tower toward the fences and rendezvous beyond with the British destroyer.

IV

The lights went up in the crowded wardroom, highlighting the wreaths of cigarette and pipe smoke coiling sullenly in the steaming air. Keilty sat to one side of the long captain's table, silently listened to the quiet arguing of the gathered officers and civilians.

Keilty's contempt of the military and civil service mind had never been stronger. They had been sitting for hours in the crowded wardroom all through the hot, sticky

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evening, debating the pro's and con's of the information that Charlie had brought back. It was all there for them to see, but some remained stubbornly unconvinced. Sitting next to him, almost wilting in the heat, sat a slight, balding man. He drummed nervously on a small sheaf of papers until they were almost unreadable; the penciled calculations smeared and blurred with perspiration.

Keilty had been on deck earlier in the evening when the MTB had come sliding up alongside the *Bradley*. Lines were secured as he slouched on the railing watching. The American Secretaries of State and Defense, the British Foreign Secretary and Minister of War and their Australian, New Zealand, Singaporean, and Malaysian counterparts and respective retinues came aboard the destroyer. The seas were beginning to pick up and the ship was rolling heavily in the increasing swells. They had gone below, some of them already green, and a few moments later a messenger had come for him. Keilty finished his cigarette and went below. They were waiting for him, impatiently, and with a barrage of questions.

He produced an extremely black, Connecticut broadleaf wrappered and foul smelling cigar and lit up. Puffing on it with relish, he began to answer questions. The small wardroom soon filled with the evil, cloying stench and finally Keilty had to admit defeat. As unobtrusively as possible, he extinguished the cigar and covered it with an empty paper cup. The meeting dragged on in spite of the cigar. Later the tapes were produced and he narrated the now familiar scenes as Charlie approached the station, examined the structure and support columns, the blur of motion as he surfaced and tried to rinse the taste of the oil from his mouth, and the underwater shots of the bomb housing.

The silence was nearly complete when he finished, broken only by the whirring of the overworked air-conditioner.

"There, gentlemen, you have it. It's as plain as the warts on a hog what is going on. What's to be done is now your bailiwick." And he sat down. As the argument renewed and dragged on, he talked quietly with the balding man next to him. It turned out that he was Dr. Iver Jensen, a Pentagon expert on the effects of nuclear weapons. So far he had not been asked to speak.

Keilty turned his attention to the discussion. Some Australian official was pooh-poohing the idea, that first of all there was a bomb, and secondly that the subsequent detonation of said nonexistent bomb could do the damage expected. And if it could, the Indonesians might then suffer as much as Malaysia, what? He was supported by several others, notably Americans. The Malaysians were looking extremely worried. Keilty glanced across the

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wardroom at Rawingson's set expression and decided it was time to do something.

He stood up and whistled. The piercing scream of the whistle echoed in the steel walled wardroom, overriding even the nasal tones of a loudmouthed American general who turned surprised and angry eyes on Keilty. Keilty paid no attention. He had disliked this particular general since having seen him on television years before, defending a particularly obnoxious Right-wing group.

The American Secretary of State turned and peered at him through his steel-rimmed glasses. "You have something to contribute?"

"Nope, but Dr. Jensen does. Why don't you all shut up and listen to him for a while? Right now you fatheads are not making much sense anyway."

Admiral Rawingson, grinning widely, told a junior officer to shut up and sit down, then settled back comfortably and waited.

"Some of you here," Keilty continued, unabashed at the angry mutterings, "know who Dr. Jensen is—you explain to the guy next to you, if he doesn't. Dr. Jensen?" Keilty indicated the audience and the speaker's position.

Jensen stood up, all traces of his nervousness disappearing quickly as he adopted his favorite speaking attitude and launched into his speech.

"Gentlemen, we know that the Red Chinese have given the Indonesians a five-megaton bomb. Your respective Intelligence services are all quite in agreement on this point. Now thanks to Dr. Keilty's dolphin, we know where that bomb is. It is sitting not twenty-five miles from us, forty-five feet below the surface of the entrance to the Straits of Malacca."

He waited until the angry murmuring died away somewhat.

"Whatever you believe at the moment, is of no importance. There can be no doubt about it. That bomb is there. The radiation readings are too strong to be anything but those from a crude, fusion device, poorly shielded . . ." Jensen raised his hand to forestall a question. "No, the radiation is much too strong to come from drilling or current tracing processes."

Jensen pulled the tripod mounted blackboard around and quickly sketched out the outline of the Strait—essentially a narrow channel running southeast to northwest and widening gradually at the two-hundred-mile point until it was nearly two hundred miles wide at the five-hundred-mile extreme length. At the entrance to the Strait, he drew in the Island of Singapore and directly south dotted a group of islands that filled the entrance, leaving only narrow channels. With a series of dots in red chalk, he indicated the main part of the British fleet—composed mostly of MTB's,

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fast destroyers and corvettes, and minesweepers. To the south he drew the ragged outline of the coast of Sumatra and its islanded shore.

"Now, gentlemen," he went on, turning to face the others, "you are all pretty much familiar with this area by now. As you can see, the Indonesian research station—and the bomb—are here in the center of these islands at the head of the Strait. First of all, we now know that these islands were evacuated six months ago under the guise of resettlement of the islands as military bases. These islands are volcanic in origin and their peaks are quite lofty, rising some eight and nine thousand feet. These two islands, Tandjung on the Sumatran side and Karimun on the Malaysian, are our two containment islands. By that I mean that these two islands will absorb a good portion of the blast and shockwave, thereby protecting the two mainlands from bomb damage *per se*. The smaller islands, forming the apex of the triangle will seal off the South China Sea from both the bomb blast and the resulting tidal wave. Now, because the wind currents in this area are northerly, and quite strong at high altitudes, the majority of fallout in the form of radioactive rain, will be carried north across Singapore and southern Malaya state.

"The channel of the Malaccan Strait is four to five hundred miles long—only two hundred of which are important to us. This two-hundred-mile stretch is the narrows, the area where guerrilla infiltration is the heaviest and where the British fleet is concentrated. I don't think anyone here will dispute the fact that it is only the presence of the British here, that keeps Indonesia from swarming across the Strait and up the Malay Peninsula." Jensen beamed around the room.

"To continue, the depth of the Strait is relatively shallow, roughly twenty-five fathoms and only about thirty miles wide.

"If, gentlemen, this five-megaton-bomb is exploded in its present location a tidal wave will sweep up this channel, carrying everything with it to destruction. If you don't believe me, which I see a great number of you don't, it can be proven with a few simple calculations. Permit me?"

"The shallow underwater bursts," Jensen said, juggling the stub of chalk, "of the Bikini 'Baker' tests twenty years ago give us a set of data to extrapolate. Our problem is first, to determine pressure variance between open-water explosions and open-channel—such as the Strait—explosions at equal distances. We do this as the Bikini tests were conducted in open water and, therefore, the data we have is based on open-water explosions.

"If we assume a radius of 100 miles for easy calculation, and draw a rough sketch of the blast area

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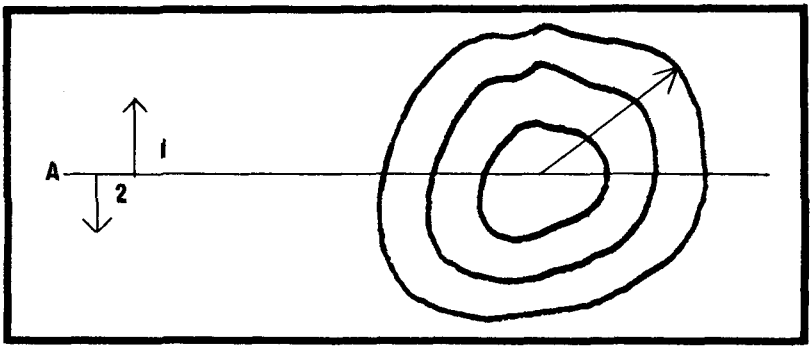
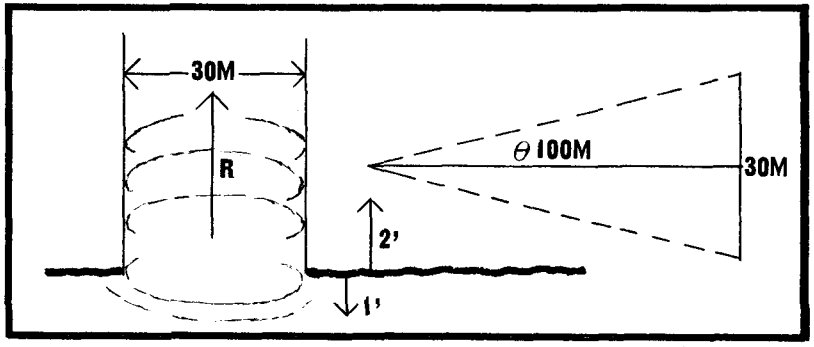


we can find the amount of water moved at A_2 by this simple equation:

$$Q = AV_2$$
$$A_2 = (\pi R)\ V_2$$
$$= 100\ \pi V_2$$

Now, if we picture the Strait of Malacca as looking like this:



We can find, assuming that the depth equals unity, by

$$\text{With: } \theta = \tan^{-1}\left(\frac{15/}{100}\right)$$
$$= \tan^{-1}(.15)$$
$$= 8.5$$
$$2\theta = 17$$

And, arc length @ 100 miles $= \frac{\pi(2\theta)(100)}{180}$

$$= \frac{\pi}{180}(3{,}400)$$
$$= 19\pi$$

$$Q_2 = A\ V_{2'}$$
$$= 19\pi\ V_{2'}$$

Now, in the ideal case, assuming no flow losses:

$Q_2 = Q_{2'}$ for equal point pressures.

This, therefore, gives us

$$100\pi\ V_2 = 19\pi\ V_{2'}$$

or

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$$\frac{V \text{ open water}}{V \text{ open channel}} = \frac{19/}{100} = .19$$

In other words, gentlemen, this all simply means that the velocity of water moved in the channel, will be 5.27 times as fast as in the open sea."

Jensen paused in his whirlwind delivery. "Stick with me, gentlemen, we've just begun. And we haven't even come to the bomb yet," he finished with a grin.

Keilty craned closer for a better look. The calculations were just so much Greek to him, as he was a psychologist and had flunked second-year high school algebra while a freshman in college.

Jensen started in again.

"Now, applying Bernoullis' principle: $P \alpha V^2$ or in this case $P_2 + 1 \alpha P_{2'} + 27.8$, we find that the pressure will be 26.8 times greater in the channel than in the open sea—all of which is going to cause a wave, and quite a wave at that as you will see in a moment."

Keilty was grinning openly now as the little man hopped animatedly around the board. There was no trace of the fussy college math professor about him that you would expect. He was just a man obviously in love with his numbers and theories.

"Based on constants used in the Kutter-Ganquillet formula for open-channel flow:

N = 0.010 for a smooth surface
=0.050 for a natural channel

So we have now

$\Delta P = 26.8/_5 = 5.56$

and because of the bad sea conditions tomorrow and some pressure absorption out into the open sea, we shall assume a safety factor of 2, and still get

$$\Delta P \text{ final} = \frac{5.56/_2}{2} = 2.8$$

which indicates simply that any bomb exploded in a thirty-mile wide channel would affect a water pressure force equivalent to a bomb *2.8* times its size, exploded in open water.

"Gentlemen, do you now realize that this five-megaton bomb, this relatively dinky bomb, if exploded in the Strait of Malacca would be equivalent to a fourteen megaton bomb exploded in the open sea."

Jensen paused, waiting for the conclusion to sink in. Keilty, who had only a hazy, layman's idea of the sizes and potential power of thermonuclear weapons was puzzled at the deeply shocked silence and then the flurry of activity that followed. Commonsense told him that any bomb exploded in a confined area would be greater than one exploded in open surroundings. He did not realize, however, the magnitude of greatness involved. Slide

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rules were hurriedly consulted and notes began to fill scratch pads, but Jensen did not wait. He went on at the same breakneck speed.

"Now, gentlemen, comes the real corker. We now know that a five-megaton bomb will be equivalent to a fourteen-megaton bomb, a seven to a twenty, ten to twenty-eight, twelve to a thirty-four, fifteen to a forty-two, et cetera.

"We can extrapolate from a simple chart, I believe it is Figure 6.79, from the *Effects of Nuclear Weapons*, an AEC publication—I forgot to write it down earlier," he admitted somewhat sheepishly. "Anyway, figuring on our five-megaton bomb to equal fourteen megatons—which is 14,000 kilotons for easy figuring, we can easily extrapolate known graphs.

"Since the chart is scaled to 85 feet, we must rescale and we have a scaled depth of $180/(14{,}000)^{1/4}$

$= 180/10.9$

$= 16.5$ ft.

where h_{85} = the wave height @ 200 miles = 0.036

$h_{16.5} = h_{85}$ (scaled depth)

$= .036\ (16.5)$

$= .595$

Now, the wave height

$= W^{1/2}\ (.595)$

$= 118.3\ (.595)$

all of which gives us a wave height, that even at the two hundred-mile mark from surface zero, will be 70.4 feet high for a five-megaton bomb. The wave height from this bomb at thirty miles from surface zero can be derived:

h_{85} @ 30 miles $= 0.18$

$h_{16.5}$ $= .18\ (16.5)$

$= 2.98$

Wave height $= W^{1/2}\ (h_{16.5})$

$= 118.3\ (2.98)$

which means that this wave will be 350 feet high thirty miles from surface zero!"

By now the gathered military and government officials had received so many shocks they merely greeted the result, they had all been afraid to admit to, with silence.

"A last thought, gentlemen," Jensen said, rubbing off the blackboard. He turned to face the wardroom. "The force of this wave along its thirty or so mile wide front will be on the order of 100 billion pounds! The coast of Malaya bordering the Strait is low-lying flat lands, while the Sumatran side is fairly high, shading up to coastal mountain ranges. A wave of this size and with this much power behind it in a channel as narrow as this will most surely be a breaker-type of wave—a great chance for surfers, I suppose—and not a swell.

"If you are at all familiar with tidal waves, you know that no matter how great the wave or the force it packs, it is a long swell in the open sea over which ships ride hardly knowing they have been 'caught' in a tidal wave. However, when

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these tidal waves approach shallows and bays or harbors, they become immense breaker-type waves. That is the same situation we face here."

Jensen turned quickly to the commander of the *Bradley*, "Captain, would you say that you could ride out a fifty-foot wave—a breaker wave—let alone a three hundred fifty foot breaker?"

"Well, I don't know," the captain answered slowly, "a fifty-foot breaker maybe. But any ship smaller than we would not stand a chance."

"Exactly sir, anything smaller would not stand a chance against a wave of this size. And most of your fleet is composed of motor torpedo boats, corvettes, minesweepers, and destroyers smaller than yourselves. Thank you, gentlemen." And he sat down.

From where he sat Keilty spoke up again. "How about that. With one fell stroke, the Indonesians are going to kick you neocolonists out of Southeast Asia, and flank the Imperialist Yankees, all while isolating Australia, with the extra added attraction of attacks on Sabah, Sarawak and Bruni in the bargain."

His voice was heavy with sarcasm as he went on. "They will close the world's busiest shipping lanes to whoever they want and scare the hell out of the Philippines, Japan, Indians and Thais, et cetera. They will ruin one of the world's greatest city-banks, starve millions to death because of it, and occupy for free, the world's largest and most powerful naval base.

"The bomb will kill thousands of British and Australian troops, wreak havoc with the British fleet at anchor in Singapore and destroy that part in the Strait, and throw you all out of Southeast Asia. You know as well as I do, that since the break-up of the Federation Singapore is in effect, a British Crown Protectorate again. Those are Commonwealth ships and men out there. To attack them would be an act of war. Those troops that survive will have to pull back up the Malay Peninsula. The Indonesians will field the strongest army you have seen in this area since the Japanese in the early '40s right behind you as you retreat. And what are you going to do about it?"

Keilty's voice was calm but his face was angry and red. Everyone in the steaming wardroom was quiet, listening to him expound the fears they were loath to admit.

"Perhaps you will bomb," he continued, his voice beginning to rise. "The U.S. won't be able to give you much help. They will be too busy with the Red Chinese in the north. If we have to fight another engagement—and this one will be major, we will be overextended in the entire southeast Asian area. The Chinese will drive straight down the Indo-China peninsula like a red rug. Who's idea do you think this is anyhow?

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"What will you do?" he challenged the British Foreign Secretary. "Use your nuclear bombs on Indonesia? Invade? Not likely. You are twelve thousand miles away and Singapore is your *only* base." Keilty drew the word "only" out, adding a nasal twang, and watched the man squirm. "All you have left as far as missiles or bombers go, are those medium-range things and nobody out here is going to give you bases for them. Your only big air bases in this part of the world are right in Singapore. The U.S. will be busy with their bases in the Philippines and Guam."

Keilty swung round on the Australian Minister of Defense. "You've just begun receiving those twenty-four F-111s you ordered from the U.S. They are not even operational yet. The Indonesians will sweep up your navy like toy boats. You people waited too long to rearm.

"And do you think that the U.S. will be in any position to help? They're going to be mighty busy up north and likely even in Korea. Can't you people realize that this is big? That it's not just an isolated incident, but part of a well planned scheme to kick you people out of this part of the world. You don't play around with nuclear weapons for kicks and the Indonesians and the Red Chinese know this as well as you do. They also know they cannot win single or small engagements. But if they can tie you up in a major war, they can negotiate their way into the best settlement they could hope to make—all of Southeast Asia, because they will already hold it!

"Face it," Keilty's voice was very cold, "the Indonesians have you if that bomb goes off." He paused for a moment then went on. "Your problem is to see that that bomb does not go off. It's that simple."

There was silence for a moment when he finished speaking. Finally, the British Foreign Secretary spoke. "Thank you, Dr. Keilty. We are well aware of the problems we face here. However, there are certain ramifications, such as incursion on a sovereign nation's territory, world opinion . . ."

"Nuts," Keilty interrupted shortly. "World opinion be damned. You and the French let yourselves be swayed by world opinion in 1956 and as a result, Nasser made laughing stocks out of you."

The American Secretary of Defense coughed and fidgeted. Keilty grinned.

"This time," he went on, "you are going to make asses out of yourselves if you continue to sit around down here and let that bomb go off. As for world opinion, the Indonesians have dug themselves their own grave. This research station has received a fair amount of publicity in the past few months. So turn it against them. Pull a surprise raid and disarm the bomb before they can set it off."

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A signal man came in hurriedly, saluted, and handed a flimsy to the HMS *Bradley's* captain. He read it through and looked up solemnly.

"Gentlemen, there seems to be an Indonesian warship heading out to the tower from Jakarta. Our Intelligence believes the ship to be a destroyer delivering the trigger device and will take the people off the research station. Their ETA is for 0900 tomorrow."

"And," Keilty interrupted, "you have a heavily armed destroyer, one hundred marines and two MTB's. And your last chance." He stood up abruptly and went on deck, pausing to speak briefly with Charlie, in his tank near the bow. He left and climbed forward over the winch until he was leaning against the railing at the bow of the ship. He watched the curving knife edge of the prow slash methodically into the marching procession of white caps, the water curling away to either side of the bow, half as high as the deck, in black sheets. The lifting crash of the bow against the waves set the entire ship to shuddering under the sharp concussive shocks. He stayed there watching, wondering what they were deciding below, feeling that he had made a fool of himself for his outbursts.

He turned and clambered back to Charlie's tank, hoping that at least if they didn't have sense enough to put a stop to the Indonesian foolishness, they would clear out of the Strait—but fast.

V

Keilty crouched on the lee side of the MTB's cabin, watching the radio operator through the aft hatch, head cocked to one side and earphones held with both hands to his ears. His face tightened for a moment, then he reached for his pencil and began scribbling out the message. Keilty looked at the huge Maori Marine lieutenant beside him in the camouflage greens of the Royal New Zealand Marines. When the radio operator nodded vigorously at them, the Maori smiled broadly and went below to chivvy up his troops. Keilty remained where he was, crouching into the open hatchway to escape the blowing spray that was spuming back from the bow. He was wondering how he had got himself involved in this mess.

A few minutes earlier, they had dropped Charlie over the side and watched him disappear under the chopping waves. Two miles southeast, the Indonesian destroyer was coming fast. Depending on the sea conditions that were worsening steadily to hide them from the destroyer's surface radar, they had dropped Charlie and were roaring northwest in the direction of the research station. Charlie, with a limpet bomb in his beak was waiting for the destroyer. He would plant the limpet mine and then be picked up by the second MTB. Twenty minutes later the mine would ex-

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plode and the destroyer would be damaged severely enough to have to turn back in these heavy seas.

Keilty had spent twenty minutes explaining to Charlie just how and where to plant the bomb. Charlie was not a fast swimmer, but was capable of twenty-five knots or better. By loitering in the area, he should be able to catch the destroyer before it passed him. The message that had just come in was from the *Bradley*. Two more British and one Australian destroyer and two New Zealand minesweepers were rushing down from Singapore to supplement the *Bradley*. The two MTBs were detailed to go in immediately word was received that the Indonesian destroyer was out of action. They would land their ten marines each under covering fire they and the *Bradley* would provide. The station must be secured as fast as possible to prevent the crew on board destroying the bomb and evidence that it had been prepared for this special operation.

Keilty looked at his watch in the dim glow from the interior of the small bridge. Just about five minutes to go. He hoped that the second MTB had not missed Charlie in the stormy seas. Peter Owterry, the Maori lieutenant slid in next to him, grinning from ear to ear.

"All set on this end. It promises to be a mighty good show . . ."

Keilty raised his hand, "Quiet a second," and indicated the radio operator scribbling on his pad.

He tore off the sheet and handed it to the boat's commander who swung round, and grinning from ear to ear, said, "Look's as if your dolphin made it, Dr. Keilty. He's been picked up and without the mine."

Suddenly, the storm-shrouded horizon was lit by a brilliant flash, revealing heavy clouds banked tier on tier. As if waiting for the signal of the explosion, sheets of lightning ripped the sky and followed by heavy rolls of thunder, rain poured down on the small boat, causing a steady drumming. Before Keilty could pull his slicker tight around him, he was soaked clear to the skin by the heavy drops. The rain cut effective visibility to next to nothing.

Owterry, staring up into the driving rain, laughed. "This rain is certainly going to be a help. It seems that the elements are conspiring with us for a change, instead of against us. The rain will hide us from lookouts and the waves from surface radar."

The radioman interrupted again to announce that the flash had been the explosion of the Indonesian destroyer. The *Bradley's* radar showed her steaming at about four knots for the nearest point of land which was the extreme southern tip of Sumatra.

Keilty hung on to the bridge stanchion as the deck whipped beneath his feet. The MTB, taking the full brunt of the pounding waves danced and leaped from wave to

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wave in the heavy seas. The rain fell harder and was thrashed by the wind into the flying spray until it seemed to be a solid sheet of water. The two boats hammered on into the north, skirting the larger of the islands until shortly before dawn, the commander throttled down. Keilty went down into the cramped cabin where he could watch the radar building a picture of the research station. The short-range sweep showed the *Bradley* some ten miles west, steaming on at close to thirty-five knots. The British commander swore softly to himself when he heard the *Bradley's* speed.

"She was built during the latter part of the war," he said to Keilty in his soft west country accent. "She must be taking a terrible pounding in these seas." Then he brightened, "I'll bet all those high muckety-mucks aboard are wishing they could die." Keilty agreed wholeheartedly with the picture.

The MTB came around the tower at almost full power in a heeling, skidding turn that would have done credit to an outboard. Her sister ship followed, and Keilty wondered how Charlie was taking all this. His conscience had been bothering him since Charlie had gone overboard. Events had moved too fast for the dolphin to keep up with. He was confused and nervous and if Keilty had not known better he would have thought the dolphin was scared silly. But, the animal's nervous condition was close to actual human fear. He had almost huddled in his tank, aboard the tossing craft, his flippers and tail making fluttering motions against the side of the tank, his eyes rolling back until the whites showed, gleaming palely against his almost black skin. Keilty had done his best to calm him, stroking his flanks, moistening him with a large sponge and promising a long, quiet airplane ride when this was all over.

Keilty knew that the dolphin was aware that this mission was much more dangerous than the other. He would be completely detached from Keilty and would not even see him when it was over. He would be depending on others to look after and pick him up. In addition, the storm had frightened him. He had never seen a storm from the surface before and the lashing waves and tossing motion of the boat were rapidly giving him a classic case of seasickness. But when it came time to put him over the side, these symptoms disappeared and the dolphin shot over the side and sounded deeply. Keilty only hoped that he had not been frightened so badly he would revert to his native state.

Owterry plopped down beside him and shrugged out of his slicker. "Have to clear the decks for action," he said cheerfully. "Can't move at all in that blasted thing. Besides, I couldn't get any wetter." He peered over the side at the thrashing waves and then to where the bulk of the station could be seen

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dimly outlined against the black sky. "Looks like we may have to go in under fire. *Bradley's* not in position yet and she couldn't fire from where she is without hitting us."

"Hell of a fine fix to be in on a night like this." Keilty muttered. He shrugged his shoulders against the rain that was pelting down and seeping beneath his collar and down his neck. The deck boards had a nasty habit of dropping away suddenly and then smacking hard against him as the boat slammed sharply upwards. Owterry climbed unsteadily to his feet for a better look.

"Damned station's awfully quiet . . ." As if waiting for just this cue, the Indonesians opened up with a withering hail of light-arms fire. Keilty pressed himself into the deck to escape the hail of lead that stitched into the hull with amazing accuracy. Owterry dropped half on top and squirmed over him into the open hatchway, then reached a huge hand up and around and dragged Keilty after him.

"Captain," he shouted against the screaming of the wind and engines, "can you run us in under the deck of the tower?"

Keilty looked at him slowly. It would be suicide to get in under the deck in these seas. One heavy wave could crush them against a supporting column or even the underside of the deck. The commander obviously thought so, too, but Owterry rushed on before he could interrupt.

"Get in under the overhang of the deck and around to the far side where that ladder is. MTB 203 can stand off and sweep the decks with machine gun fire until the *Bradley* gets here. By that time we should be aboard." He paused to take a quick look at the tower, illuminated now by heavy flashes of lightning and by the quick, small flashes of the fire fight. The accuracy of the station gunners aim had fallen off drastically in the heavy seas. As Keilty watched, the station was hidden from view by a large wave until only the upper works of the tower showed. Then the station was in full view as they crested, then lost again.

"Once we get in and onto the ladder, put out quickly and keep them busy around the top of the ladder, so they can't get to us."

It took Owterry only a few minutes to convince the boat's commander that it was the only way, under the circumstances, to secure the research station and the bomb.

Signals were made to MTB 203 advising her of the plan and then to the *Bradley*. Then, with the commander at the wheel and the twin Rolls turbines screaming to full rpm, the boat went in on a straight course, direct for a point two hundred yards from the ladder. The MTB sliced through the heaving seas at forty-five knots, bouncing like a surfboard, then straightened

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out and beat her way through the twenty-foot waves. Water boiled around her stern from the creaming bow wave, half as high as the swept-back mast. Keilty, crouching in the bow with the initial ten-man landing party, hung on for dear life. He hung back slightly, trying to stay out of Owterry's view, but the New Zealander was so busy trying to gauge the distance and the effect of the shells and bullets that were beginning to converge on 202, that he paid no attention.

Keilty watched the big Maori at work marveling at the calmness of his Oxfordian voice, deeply resounding above the racket of the storm. One of the marines had proudly told him earlier that Owterry was educated in England at Saint James had been New Zealand boxing champion and had almost taken the Commonwealth boxing crown until the war interrupted. Owterry had told him himself, that he had fought down the Malayan peninsula from Burma in 1944-45, and back-up the peninsula against the communists in 1947-50.

"You're lucky we're in the Straits and not on the mainland. This is relatively clean. Malaya has jungles like nowhere else on earth."

Keilty had caught a glimpse of the leech scars on his hands, wrists and ankles, and mentioned them.

"A doctor once told me that the scars on my ankles form a ring of scar tissue nearly an inch deep," he had replied with a grin. Keilty was

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prepared to believe anything about southeast Asian jungles after seeing that.

The distance was now down to less than a thousand yards. A flurry of light 1.5 inch shells splashed and exploded dead ahead of them. The concussion and water they kicked up almost washed Keilty over the side. The commander kept the boat steady on its course. Keilty watched the tower loom ahead of them, seeming to grow larger with infinite slowness. A second salvo hit closer, bracketing the boat and lifting the bow high in the air. For a second, it hung suspended.

Keilty had time to notice that the rain which had become almost horizontal was no longer pelting him for a brief second as the hull came between him and the watery horizon. Then the MTB slapped down hard, jarring every bone in his body. He tasted blood in his mouth where a tooth was knocked loose. His back was on fire where the M.15 carbine crashed down on its loose sling. Dazedly, he noticed that the boat was skidding into a hard starboard turn as the engines cut out then, screamed up as the propellers reversed and the boat slid under the overhang, port quarter first.

The commander idled the engines down enough to maintain steerageway and turned her towards the single narrow ladder, outlined dimly by the hooded beam of the boat's searchlight. They drew alongside the ladder, and were held fast by two ratings as they piled over the side into two rubber life rafts. Keilty was the last over. He ignored Owterry's shout and watching the bobbing raft, jumped and landed half across the stern and was hauled into the bottom of the raft.

"Where do you think you're going?" Owterry stormed at him from the other raft.

"Where do you think," Keilty shouted back. "Stop yelling and let's get going. I've got a vested interest in this operation."

Owterry waved the MTB away. It idled away from them and then slipped into full power and shot from beneath the deck, its two quad .50s blazing away at the station decking. Keilty watched it roar away, swinging in a wide circle to allow the gunners to track their target, until he lost it in the rain and fog. The noise of the fighting came to them in a mishmash of hollow sound, reflected from beneath the steel tower by the chopping seas. The rafts were made fast to the tower ladder and the New Zealanders swarmed up. They had shed their packs on the MTB and went up in only shirts and shorts, weapons slung over their shoulders within easy reach, their hands free for the ladder. They went up professionally. Keilty was pushed back until he was last man on the ladder. Gunfire sounded above and a brief spray of bullets swept past him. A body

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came hurtling down; which side he was unable to tell.

Then he was being yanked over the top and pushed down behind a hastily constructed barrier of oil drums. Owterry was waving four men around the far edge of the barrier in a flanking movement to the drilling rig. Snipers in the rig took two of the men before they had taken five steps. Cursing horribly, his eyes white rimmed in the flashing lightning, Owterry landed beside him, directing a barrage of fire to the rigging. Keilty unslung his carbine, worked the slide to make sure it wasn't jammed and aimed at a figure crouching behind a web of bracing halfway up the tower. He fired three shots and missed. Rain water sluiced down the barrel and spattered into his eyes. He shook his head and rubbed his eyes clear, ignoring the stinging, then turned his attention back to the sniper. He slid the catch to full automatic and opened up. The figure straightened, took a quick step backwards, arched its back, and sailed off into space. He landed with a sodden thump on the steel deck plates. Grinning savagely to himself, Keilty jammed another magazine home.

Across the deck, near the main shaft of the tower, were a series of low corrugated iron sheds. As Keilty glanced towards them, seeking another target the door in the one nearest was flung open and four men poured out. They dove for positions around the shaft, setting up a machine gun. The entire movement was performed so quickly that it took the marines off guard. The machine gun quickly opened up. Keilty ducked back around the oil drums just in time. A sharp clang and a steel sliver was nicked from the drum where his head had been. The machine gun traversed the row of drums and was followed by rifle fire while the gunners turned their attention to the three men who had reached the rig. They were all now effectively pinned down. Keilty ducked back deeper into the safety of the oil drums. Owterry yelled something that was lost in the rattle of the machine gun and the series of clangs from the drums.

The man next to Keilty struggled into a sitting position while he fumbled in his shirt. Then, going to his knees, he straightened up and started to hurl a hand grenade. Two fifty-caliber slugs stitched across his chest and he fell back, dropping the live grenade into Keilty's lap. Keilty was so surprised that he stared stupidly for a moment, then straightened convulsively and kicked out with his foot, pitching the grenade over the side of the deck where it exploded. Owterry rolled his eyes to heaven—whether in thankfulness or supplication, Keilty could not tell. Then the machine gun was back.

Keilty could now see the three flankers clearly. And they were *clearly* pinned down. They had de-

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pended on the main party to furnish them with covering fire while they flanked and came up on the main body of the defenders holding the deck. Now that the main party was pinned down, they were exposed to a flanking movement themselves. Which was precisely what was happening. Three Indonesian soldiers were crawling towards the party from their left, using the cover furnished by equipment and machinery. The flankers were kept pinned by the machine gun and so could not effectively cover themselves.

Keilty pulled the remaining two grenades from the shirt of the dead marine. The pictures that Charlie had taken earlier of the sea had shown a small ledge running the circumference of the top of the main deck. It was only about five feet below the level of the deck, but it had looked wide enough to walk on.

Ignoring Owterry, he crawled back to the ladder, careful to keep the drums between himself and the machine gun. One of the snipers in the rig saw him and began firing. The bullets slammed and ricocheted viciously around him. With one sliding leap, Keilty grabbed the edge of the ladder and all but vaulted over. His foot caught the rung and he yanked his head down below the deck.

The ledge was there, but it was not really a ledge, more of a catwalk with ladderlike rungs. He crouched down and slung his rifle with one hand, being careful to keep one hand on the ladder. The wind had picked up now and was blowing close to thirty knots. The rain pelted down in huge, swollen drops that all but blinded him. He worked the hand grenades into his pocket and began inching his way along. He worked carefully, placing one foot on the rung ahead, hanging on to the slippery edge of the decking. The wind tore at him, pulling, then plucking at his sodden shirt and levis. His leather boots were soaked through with the heavy premonsoon rains, in spite of the waterproofing he had applied earlier in the day.

After what seemed an eternity, he stopped and raised his head carefully above the decking. He could see the dim outline of the barrels and to his right, still some fifty feet away and hidden by the machinery, the flashes of the machine gun. The wind was now so loud in his ears that nothing else seemed real. The flashes of the guns were soundless in the immensity of roaring wind and water that filled his head. He lowered his head and started forward again. Once he slipped and caught himself from falling into the thrashing water seventy feet below only by his fingers. He managed to hook a leg around a rung and rested for a moment. Then he was moving again. He never knew how long it actually took him, but it seemed forever.

At the end of another hundred

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feet, he stopped and raised his head for a careful look. Almost in front of him and some fifty feet away crouched the gunner and the man feeding the belt. On the other side, two rifle men with automatic weapons were firing carefully and accurately over the top of the rigging machinery.

Keilty levered himself up into a half crouch, one knee hooked around a support rod. He fumbled with a grenade which resisted his efforts to pull it from his wet pocket. He cursed the tight levis he was wearing. Keilty had made a turn coming around the edge of the decking so that he was now taking the full force of the wind against his right side. The wind was becoming fitful now, rising from its steady thirty knots until it was almost a full gale, then dropping suddenly with no warning. Every time it rose, Keilty had to stop and hang on to keep from being blown off the tower.

Finally in desperation, he straightened his legs, and half bending from the waist to keep his head below the level of the deck as much as possible, Keilty yanked the hand grenade free. He shoved the narrow end with the lever into his mouth. The weight of the steel ground down on his broken tooth, making him gasp in pain. He almost lost the grenade, but managed to hang on, fighting the waves of nausea that threatened to make him vomit. He transferred hands, and worked the other hand grenade loose in his pocket. For a second, he caught a brief glimpse of a raft in the flickering lightning, full of men, pulling to the ladder as the wind screamed around them.

The machine gun was now concentrating its fire on the barrels and the top of the gangway. The flashes from the muzzle were almost a steady stream of fire. Keilty straightened as much as he could, aware that he was silhouetted against the lightning filled sky. With his left hand, he twisted loose the pin on the grenade in his mouth, then transferred it carefully to his right hand, careful to keep the lever down tightly. He tried to judge the wind, waiting for a lull, then threw with an overhand swing and missed. The grenade landed short and well to the left of the machine gun, bounced once and exploded harmlessly.

Keilty straightened again, peering over the edge of the decking. Rifle slugs whined past his ears as he pulled the pin on the second grenade. The men ahead were frantically swinging the machine gun around as he threw the grenade with all his strength and ducked. The grenade hit and skidded across the deck, bouncing directly towards the spitting rifles and exploded under the tripod of the machine gun. Pieces of steel whined away into the night. Keilty edged his head up. Lightning showed the rig pipe racks, directly above the gunners, to be a

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shambles. The twisted barrel of the machine gun lay against the dented side of the cabin. The grenade had exploded between the rig and the cabin, funneling the exploding shrapnel both ways, mowing down the four men like paper cutouts. They lay strewn at odd angles on the deck.

Owterry and his men rushed the cabin from the cover of the barrels, clearing the last of the defenders from the deck and rigging as they did so.

Keilty climbed stiffly over the edge of the deck and stood up slowly. From where he stood he could see the raft load of marines begin to appear around the top of the ladder, slowly at first, then more quickly as they met with no resistance. They paid no attention to him standing in the shadows, his carbine still slung, but disappeared below after Owterry.

There were only a few white lights still burning in the rigging and the red warning light over the cabin's wrecked door. Somehow it had escaped the bullets and exploding shrapnel.

Keilty followed below after the last squad. He caught up with them at the beginning of a corridor that led into the center of the station. The station was laid out in a square, some two hundred feet across and three levels deep. The corridor down which they were now moving cautiously, led to the sleeping quarters and mess hall. The bare, unfrosted bulbs were glowing dimly in the ceiling and the steel walls, painted a deep gray, reflected little of the meager light. The marines moved slowly down the corridor, five to each side. They stopped once to check what appeared to be an empty office, its door half opened. The corridor was the main passageway to the center of the station. At its end, it branched to the right and left. When the Royal Marines reached the junction, they cautiously edged a helmet around the corner. A flurry of shots rang out and the helmet spun down the left branch. A corporal armed with a tear-gas gun, poked the muzzle around the corner and fired two successive cylinders. Keilty, without a mask, beat a hasty retreat back to the deck.

The rain had steadied to an insistant needle drive that immediately drove him back into the shelter of the stairwell in the entrance to the cabin. The rain stabbed at his skin, ignoring the meager covering of his wet shirt and levis. Through the rain he caught sight of the dim silhouette of the *Bradley*, several cable lengths away. The destroyer was steaming slowly around the station to maintain steerageway in the heavy seas. As he watched, the destroyer focused two powerful searchlights on the tower, throwing details into sharp bas-reliefs of black and white shadow that shifted constantly as the destroyer fought through the pounding waves.

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More marines, slickered against the driving rain, were clambering over the side of the deck from a motor launch below. Another hatch was opened and they quickly disappeared below, leaving the deck suddenly deserted, except for three woebegone prisoners standing half drowned in the rain while their guard leaned negligently under the protecting overhang of a shed, his rifle circling slowly in their general direction.

Keilty stood listening to the wind screaming its high pitched wail through the spiderwork of the tower, wishing mightily for a cigarette. He had just decided to go back down below decks to see what was happening, when five gas-masked marines came through the hatchway behind him, pushing a batch of Indonesian prisoners—their hands clasped over their heads and eyes streaming—out and hurried them across the deck.

Owterry followed the prisoners up. He caught sight of Keilty standing in the shelter of the cabin and came over.

"War's over," he announced cheerfully. "Thanks very much for your help by the way," Owterry added.

"Hooray," Keilty muttered. "I need a cigarette."

Owterry hauled out a soaking packet, glared at them in disgust and threw them away. "They're bringing up portable fans to blow out the tear gas," he said. "The place is full of it and somebody wrecked the air-conditioning system."

He produced a spare gas mask and handed it to Mort. "Put this on and let's go take a look at the bomb. We got to it in plenty of time. Those idiots hadn't even attempted to get rid of it."

They ducked into the thinning fog of tear gas that was rolling up the stairwell. Keilty noticed that someone had got the generators going again and the bulbs cast a considerably stronger light. They passed the office and several Indonesian prisoners now occupied it, milling around sullenly, guarded by two marines with leveled weapons.

The tear gas had thinned out quite a bit and Keilty and Owterry removed their masks. He took a good look at the prisoners as they passed the office. Their clothes and hair were streaming with water and forming puddles on the incongruous green carpeting in the steel bulkheaded room. They had the hard bitten look of professional soldiers and they were alert and tense, in contrast to the three Keilty had seen on the deck. These were professionals, where the others had probably been scientists and technicians. The two guards appeared ready for trouble and their carbines were on full automatic.

Owterry led him along a narrow catwalk, then down a vertical steel ladder into a featureless ovoid room.

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Keilty glanced back up the tube through which they had just climbed down, noting that it was a hydraulically operated telescoping tube.

In the center of the room a steel case about the size of a pickup truck was placed. There were the usual meaningless dials that Keilty had expected and when he walked up for a closer look, he noticed that they were in Chinese. He looked around the room. Besides the case, which was on the raised platform on which he stood, the room was completely bare. The room itself, was lit by soft fluorescent lights. Keilty noted the incongruity of the General Electric trademark on the light fixtures and the Chinese symbols on the fusion bomb.

Suddenly, it occurred to him that *he* was standing in the same room with a five-megaton thermonuclear bomb. The bomb itself might be harmless without its trigger, but its radiations certainly were not. He moved quickly and grasped the arm of a marine leaning against the casing and yanked him away.

"Hey . . ."

"For the sake of your future offsprings, friend. Have you checked this room for radiation?" he asked turning to Owterry.

The New Zealander paled under his coppery skin. "No . . ."

"Then I suggest we all get out of here until those sorcerer's apprentices you people brought along, get through in here.

"It's not going anywhere," he added.

There was a hasty retreat up the ladder. ■

THE ANALYTICAL LABORATORY

DECEMBER 1965

PLACE	STORY	AUTHOR	POINTS
1.	Beehive (Pt. 1)	Mack Reynolds	1.85
2.	Mission "Red Clash" ..	Joe Poyer	2.20
3.	Warrior	Gordon R. Dickson ..	2.60
4.	Countercommandment .	Patrick Meadows	3.20

THE EDITOR

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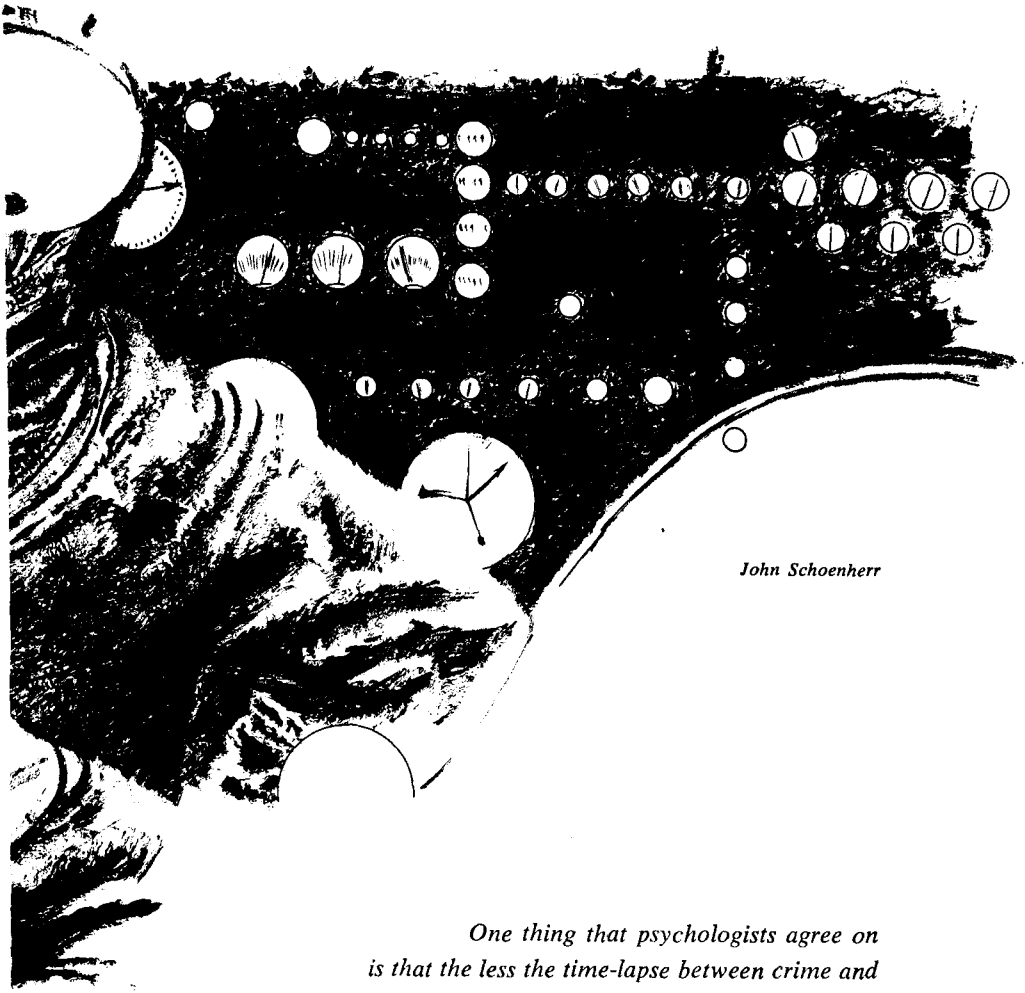

John Schoenherr

One thing that psychologists agree on is that the less the time-lapse between crime and punishment, the more effective it becomes in conveying the message DON'T DO THAT!

10:01 A.M. | ALEXANDER B. MALEC

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At 10:01 A.M. the accident occurred, setting off a triple concurrence of actions; the first of which was the following dialogue:

"What was it?" asked Slick when the vehicle pulled over and stopped.

"I dunno," said the driver as he hopped down, looked at the object on the mall and returned; the other vehicles whistling above him. "Looks just like a rag doll. You know, no frame, no nothin'."

"Did you see it coming?" asked Slick, reclining back with his stogie.

"Naw," said Poxie, who was the driver, as he energized the vehicle and headed it into the mainstream. "Don't hardly look real or nuthin'. All covered with catsup it looks like."

"Yeah," said Slick, observing a stream of smoke issuing from his O-shaped lips, feeling rough and "with it" in his brand-new black leather boots, his black leather trousers and his black leather jacket with the fourteen silver nodes and the five zippered pockets. "These things happen." He slicked back his bushy mop of black hair with a comb.

"Yeah," said Poxie, who was called so due to his moon-crater like complexion, that is, pock marks. He passed the other vehicles to get into the top speed lane; passed them vertically, that is.

The second and third concurrence of action took place also at 10:01 A.M. When a particular section of the roadway, with all its sensors, noted that something untoward had occurred and dispatched onward the time and location of occurrence, the course of involved machine, and due to the type of signal transmitted, caused to home in on two separate locales, two special and very different from each other vehicles.

At 10:03 A.M., the first vehicle, called simply a "Patroller," arrived on the scene, dropped to ground level, found the "Rag Doll" and carefully placed her within the Patroller.

Officer John Cramdon, never really insular from his job, wept slightly taking a Retina Identification Check, while the information automatically traveled via Pulsed Carrier to a building known only as "Center" some fifty kilometers away.

At 10:07 A.M., the information arrived from Center and stated that her name was Cynthia Marie DeSantis, red hair, blue eyes, weight: twenty kilograms, height: one hundred and two centimeters, age: eight years old, residence: 10D, 4th quadrant, Lloyd Wright Gardens, Churchill City, Kansas, mother's name: Eva Marie, father's name: Lawrence Joseph, occupation: Machinist.

This information appeared on the scope of Sergeant John Cramdon's Patroller; the visual display which, before facing out, automatically etched this information onto a

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blank transparent sheet of lucite, with the time and code letters to identify same, and dropped into a file.

The same information also appeared on the scope of the second larger vehicle now homing in on its moving target.

Also at 10:07 A.M., at the Traffic Division of Center, Captain Roland Reese, for the nth time, drew his courage together—which was parcel of his job of police captaincy—and pressed the studs on the telephone which would connect him to a residence at 10D, 4th quadrant, Lloyd Wright Gardens, Churchill City, Kansas; which would connect him to Eva Marie, mother of Cynthia Marie DeSantis.

At 10:09 A.M., Officer John Cramdon was already vectoring on a building in Churchill City, near Lloyd Wright Gardens with his cargo.

Fully twenty-seven kilometers away, where first alerted of the "occurrence," the larger vehicle took fully six minutes to overtake the top lane carrier of Poxie and Slick, which was hurtling at 200 k.p.h. This was at 10:07 A.M.

Slick noticed it first. "Poxie. You see what's in back of us?" he yelled in dismay.

Poxie looked back and gulped, "Agh! A Fetcher!"

"Hit it," hollered Slick.

Poxie jammed the accelerator fully to its limit.

At 10:08 A.M., the "Fetcher" enclosed the smaller vehicle of Slick and Poxie, and at that instant the Fetcher made a turn unauthorized to ordinary drivers, re-routed and, at top speed, homed in on Center which was now, due to the In-line chase, some one hundred thirty-three kilometers distant. The journey would take approximately seventeen minutes.

If being enveloped by a Fetcher is a chilling experience, it is not an oft-repeated one; an off-shoot doctrine of the civilization that could produce a Fetcher and a need for one.

Perhaps if Poxie were to resist incarceration by a Fetcher—as some did—by initiating a sudden turn; left, right, up, down, in the hope of at least wrecking the machine that swallowed them in an "I'll-take-one-of-them-with-me bravado," he couldn't have done so For the reason that his reaction was in the realm of the highly probable and therefore implemented against; another way of saying a de-gaussing network on the inside walls of the Fetcher canceled out his control and driving field so that Poxie's machine was as inert and immobile —and about as useful—as a large rock of equal mass.

The sudden switch from sunlight to artificial light alone is enough to induce goose flesh; the sudden change in noise level and acoustics will again produce the same sensation as the front aperture of the

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Fetcher closed much as a camera lens. Clamps thumped their device securely to the deck, and electromagnetic shoes, as a double precaution, held them fast.

There were no officers in sight; just the white painted, brightly illuminated walls and the moire pattern of the closed aperture ahead.

Suddenly, a Public Address System sounded. "Leave your vehicle. Enter the doorway to the rear." The PA system then added an emotion tinged, "Come on, you birds. Move!!"

Poxie and Slick did so. In passing through, Poxie noticed the glowing nodes placed about ten centimeters apart vertically in the door jamb. He knew it was a frisking mechanism of some kind.

They entered a small, brightly-lit room which contained a functional metal desk and stools fastened to the deck, an assortment of "Black Box" electronic gadgetry, scopes and switches on the bulkheads and two officers of the law who looked the picture of hard, well-oiled efficiency as if they had been turned out by the same machine. They wore gray uniforms, blue leather boots, triple-ridged white helmets, and to add to their anonymity and authority, they wore translucent masks.

The officer who was standing relieved Poxie of the screwdriver in his right knee pocket.

"For adjustments," said Poxie with a sly grin.

"Shaddap," said the standing officer. At that, the officer who was seated, waved at the other to ease off. Poxie knew that the "shaddap" was rare, and unauthorized, he knew these men were fighting to keep a closed lid on their emotions.

"Sit here, please," said the seated officer, indicating two stools which had two optical gadgets, about where eye-level would be. In the meantime, the other officer consulted a plastic sheet index which was in fine print. Slick noticed the title on the plastic sheet. It read: Accumulator, Location of. . . As they sat down, they could hear the other officer stomp out of the small cubicle through the glowing node doorway, in front to where their machine sat captive.

"Look through the eyepieces, keep both eyes open. Focus on the cross you see there."

As Poxie and Slick did so, they knew the officer had depressed some kind of stud, for this was a Retina Identification Check.

"All right," said the officer, and caused the optical gadgets to swivel on their brackets and nestle each in their own niche in the bulkhead.

"Where were you fellows headed?" he asked.

"Albuquerque," said Poxie. The interrogating officer had both hands flat on the desk, writing nothing down, so Poxie knew something,

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somewhere, was taking a permanent record of this conversation.

"Where were you coming from?"

"Chicago," offered Slick. The officer depressed no stud or toggle to differentiate between the two young men talking. Apparently, then, the recording device had no difficulty in separating and tagging the voices. At that moment, Poxie looked at the wall clock. It said 10:10 A.M.

"At what level?"

"Ah," Poxie stammered, "low level. You know that."

The tone of the officer's voice seemed to contort the inscrutable translucent mask into hardness, if that were possible. "Oh, I know that, all right. But, what is low level?" Poxie looked at him blankly. "Come on," said the officer with irritation. "What is low level?" The "come on" prodding of the officer surprised Poxie; very seldom these people showed any emotion.

"Eight meters," said Poxie.

"All right, that's the upper limit," said the hard officer of the Traffic Division. "Now, what's the lower limit . . . of the low level?" he added.

"Four meters," said Poxie. He was beginning to feel very nervous with the line the questioning was taking.

The inflections of the interrogating officer made Poxie think of the old-time Prosecuting Attorneys as he had seen them on the re-constituted "movies." The question he heard now was, "Four meters, huh? You sure you weren't going any lower?"

"How could we?" asked Slick. He was becoming nervous, too. "You can't go lower!"

Poxie wasn't sure the line of questioning was not part of police procedure. But the man asking the questions had a curiosity and an "In" for the two young men before him. He was literally venting off his spleen.

"Why can't you go lower?" asked the lawman. He pointed to Slick. "You."

Slick stammered, "Because the controls are, well, you know, governed; if you go any lower than twelve feet, I mean four meters, well, you might hit somebody."

"A lot of fun, wasn't it?" said the officer. This taunting was *really* unauthorized, thought Poxie. "Knocking off the tops of trees, scaring the daylights out of people."

"We didn't," said Slick lamely.

"You didn't?" said the officer. "Then how is it you struck a little girl at a cross mall? A little girl who was hardly a meter high."

Slick didn't answer. Poxie gulped and stared at the wall clock. 10:12 A.M.

At this lull in conversation, the other officer returned; the one who had gone to where the enclosed, captured vehicle of Poxie's was. He held in one grimy hand what looked

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like a battery-operated cutting tool. In the other he held what appeared to be on one side a weathered hexnut, but on the inner side, protected from the weather, looking like something else again; a shiny micro-electronic-looking something else.

Slick stared at it bug-eyed. Poxie was somewhat fascinated, too.

The seated officer spoke, "Surprise, huh?" Slick, the one who was being addressed didn't speak. "Thought you had found the Accumulator on your vehicle and put a pin through it, didn't you?" The seated officer looked inquiringly at the other officer, who took his cue and spoke.

"The other one has been found —and damaged. But this one is all right," he said and held up the Accumulator.

Slick stared at the untouched, unfound, undamaged Accumulator as one hypnotized by a twirling vest pocket watch. He stared at this undamaged, but oh so easily reciprocally damaging, Accumulator.

"How come there were two?" asked Poxie of the standing officer who held the cutting tool in one hand and that murderous piece of evidence in the other. The addressed officer didn't answer right away but handed the hex-nut disguised Accumulator to the seated officer, whereupon that one got up, entered behind a partition that half cut him off from view and performed some kind of act to the Accumulator; an act as yet unknown to the young captives.

"There's no law that says there can't be two," said the officer with the grimy hands and the cutting tool, "Or even three." Slick did a take on that "three." "The law only says there must be one." He held up one finger for emphasis, "One." Poxie and Slick followed the officer's soliloquy with no little entrancement. "So many times it happens, the vehicle's Accumulator when it leaves the factory—the one in plain sight—gets somewhat damaged." He looked at Slick with bland, tongue-in-cheek, saying, "Ordinary, routine damage. Can happen to anybody." Slick turned his eyes down on that one and Poxie looked away to the wall clock. It read: 10:15 A.M.

"So you see," said the soliloquizing officer; he was obviously the talkative one of the bunch, "Why we do what we do. In time of collision between two vehicles and in the ensuing investigation, it is necessry to fix the blame; either driver or both drivers. Or, as happens sometimes; the fact of mechanical failure on the part of the vehicle. In that case the involved driver is not held. We learn all the data surrounding and contributing to the accident from playing back the Accumulator attached to each car. I guess you know that in the event of accident with a vehicle containing a . . . ah . . . pre-damaged Accumulator, we would then

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have to rely on the testimony of drivers, passengers and other eyewitnesses to the scene. And human testimony"—he said "human" as if it were a dirty word—"is so prejudiced and . . . so inaccurate."

"Oh," said Poxie, wondering if these officers of the law were married; would they have stooped to something as commonly human as marriage.

"So," the seated officer said. "We rely on the Accumulator. It gives us a lifetime record of the car's behavior. And, in case of accident, of any kind"—he emphasized the "of any kind"—"we have an unbiased record of the vehicle's height, lane, speed, attitude at time of impact and the performance of the driver prior to that impact."

"And," took up the standing officer, arms at his sides, who looked as deadly as a viper, "the performance of the driver"—he looked at Poxie—"after the impact."

Poxie had been reasoning that a man who could stand thus, arms at sides, without any emotional crutches such as a cigarette, must be very sure of himself. When the officer stopped talking, Poxie said, "Oh," coloring in embarrassment and took in the reading on the wall clock. It read: 10:17 A.M.

"That's what is happening now," said the standing officer.

"What is?" asked Slick.

"What happens when we put the Accumulator in the Acceptor mechanism."

"What does that do?" asked Slick.

"It relays the information upon the Accumulator," said the seated officer. "Ahead. To Center."

Poxie didn't know why but he chilled when the man said "Center." The wall clock still read: 10:17 A.M.

"Just like happened," asked Slick, "when you had us look into that glass thing? It went on to Center?"

"That is correct," said the standing officer.

At this point Poxie wondered if it wouldn't be wiser to try to overpower the two officers of the law; these officers appeared to be unworried about such a thing happening and carried their sidearms outside and accessible, much as officers have always done. Poxie knew they were in deep enough trouble to make such a try worthwhile.

His notions were inadvertently replied to in the next few minutes.

The seated officer arose, and said to the other, "Are there, ah, marks?"

"Yes," said the other.

"I'm going to have a look," he said.

"I'll go with you," said the other, making Poxie's ears perk up almost a rabbit's length. As the officer went through the doorway, his hand flipped something on the right of the doorway and he said, "Sit tight. Don't move." And he was gone.

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Poxie and Slick were all alone in the interrogating cubicle of a police Fetcher vehicle, with its gadgets, meters, toggles, rheostats and scopes that were fauna of modern-day traffic misdemeanor and felony control. Poxie would have been confused as to what gadget to grab hold of first, except that the decision had been made for him when the officer had flipped that something.

"Look," said Slick, crestfallen.

"Yeah," said Poxie, also crestfallen.

"Laser bars," said Slick.

"Yeah."

All around them in an oval, to encompass them and the two stools they sat on and not much more, was a cage of vertical laser beams.

"This kind gives you a shock, I think," said Slick. "An electric shock."

"Some other kinds burn you," said Poxie.

"Yeah. And there's another kind. They use it in mining and in war, I guess. It vaporizes things."

The officers returned. The first one through flicked that toggle something on the right wall of the doorway and the laser cage disappeared. The second officer coming through said, "It's there, all right." Poxie reasoned he was speaking for the benefit of the audio pick-up device somewhere in the cubicle, for use as further evidence. "Blood," was the officer's follow-through comment. Poxie wondered how many times you can kill a dead ox; how much evidence did they need? He looked at the wall clock. It read 10:22 A.M..

The first officer through, continued through the cubicle and exited through a rearward passageway. "We're getting close," he said before he disappeared.

The second officer sat down behind the desk though the detained young men couldn't know if this one was the original who had been seated or had they switched.

"He went to bring it in," said Slick.

"Yeah," said Poxie.

"The thing was running by itself," said Slick.

"Yeah."

The second officer had his head down, both hands on the desk, reading, as best as Slick could divine upside down: "An Abstract Of Codes and Decrees As Applied To Civilian-Commercial Null-Vehicles Traversing The Alpha Roadway System." This must be, thought Poxie, how they gotta spent their free time; reading law. No novels, no nuthin'. Then Poxie had a question. And the answer, by reflection of what prompted it, pointed out the guilt of the questioner. "What," asked the pock-marked incarcerate not quite into his twenties, "are you going to do with the machine once we get to Center?"

The seated officer looked up, his mask chilling in its inscrutability, and said, "We're going to analyze it." He said this slowly. "No null-

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vehicle can possibly dip below four meters except. . ." Then he explained: "There are fail-safe circuits and auxiliary servomechanisms that make it possible to alight slowly and safely in case of power failure. But in no case is it possible for a civilian null-vehicle to dip below four meters . . . over a cross mall . . . and still retain power. There are built-in governors. But you know about that, don't you? And there are built-in power cancellors should the factory-sealed governor mechanism be tampered with. As far as we know, there is no way for a layman to tamper with a vehicle in such a manner and still manage to run that vehicle. We are very curious"—he was looking at Slick when he said this—"to see how this was done." The inscrutable impartiality mask of the law paused a few seconds before it spoke again. "It would seem . . . that we have a mechanical genius in our midst." It was a backhanded compliment with a lot of left hand to it. Slick reacted by reddening his ears a little.

While Poxie, sensing his friend's discomfiture, prodded him to give him a cigarette. He looked at the wall clock. It read; 10:24 A.M. We're almost there, he thought, and sure enough, he sensed a subtle change in the almost inaudible whining tone that is a police "Fetcher" vehicle in motion.

At 10:26 A.M., after the awesome whines and clicks outside had ceased, a final sound made itself apparent; that of the vehicle's camera aperture doors opening. It was a whirring sound. The officer who had rated Slick a moment ago as a "mechanical genius" remained seated. However, another officer made the scene. He was standing on the platform, in front of the yawning aperture opening. He was dressed in every detail as the mobile officers had been except for the green helmet and the clipboard which he held in front of him, from which he spoke loudly, "Mr. James Smith. Mr. Rodney Cooper." Poxie and Slick respectively responded to their names with a start for they had not told the two vehicle police their names. "Please follow me." They meekly complied.

They were in a huge auditorium-like building with a lacquered floor and large enough for noises to reverberate. The roof was a dome through which the brilliant late morning sun shone through some transparent building material; and behind them, the two awestruck young men saw the platform upon which similar police Fetcher and Patroller vehicles were in a constant state of arrival and departure on a loading platform so long that it dwindled, perspectivewise, into infinity. "Big business," said Slick.

They were escorted across the shining acreage of the Center's interior into a small lounge-like room.

"Wow," said Slick impressed by the luxurious interior of the room

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which was done up in hues of green, abstract art and subdued lighting.

"Make yourself comfortable," said the green helmeted officer through the translucent mask.

"Sure will," said Slick and plopped on a foam rubber sofa.

"What's all this for?" asked Poxie.

"You are to wait here," said the officer, "for your trial."

"Agh," said Poxie making a face of distaste. He now decided to sit.

But the officer didn't leave. He still had some business to attend to. Holding the clipboard stiffly, he said, "Mr. Rodney Cooper." Slick looked up with a "huh" expression.

"You are to answer one question."

"Go ahead," said Slick.

"I'm not finished," said the officer. "After I ask the question and the answer is in the negative, I must inform you that you will then be subject to a polygraph test. Is that understood?"

"Yeah," said Slick.

"Speak louder."

"Yeah," said Slick, knowing now there was an audio pick-up somewhere in this ultra-comfortable lounge.

"Here is the question," said the officer with the clipboard. "Did you, Rodney Cooper, knowingly tamper with the controls of your Mark Nine Phaeton null-vehicle so as to enable that same vehicle to traverse below the legal minimum allowable height on the Alpha-type Roadway when crossing a pedestrian mall?"

"Yes," said Slick. Then he yelled to the hidden pick-up, "Yes!"

The officer now turned to Poxie. "Mr. James Smith."

"Yeah."

"After I ask the question and the answer is in the negative, I must inform you that you will then be subject to a polygraph test. Is that understood?"

"Here is the question," said the officer. "Were you a party to this tampering, either by actual aid, sanction or knowledge, of this same Mark Nine Phaeton null-vehicle along with the aforementioned Mr. Rodney Cooper?"

"Yes!"

The officer all but clicked his heels when he said, "That is all." As he made to leave, he had one more thing to say. "To your left is a Menu Selection Board. You may eat if you wish. You have a choice of four main courses."

"Specialty of the house," jeered Slick.

The officer made to leave once more, but Poxie ran up to him and asked, "Hey, Mac. Got a cigarette?"

The police officer lifted an arm, reached into a pocket and gave Mr. James (Poxie) Smith a cigarette. He left.

"What'd you do that for?" asked Slick. "You got cigarettes."

"Wanted to see," said Poxie, lighting up, "if that guy was human."

"Smart," said Slick. "Let's go

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eat." And he rushed to the Menu Selector. Poxie made to follow him, but not before he noticed the two doors on the far end of the room. Between the doors was a wall chronometer. It read 10:31 A.M.

At 10:33 A.M. the meals came, and the young incarcerates turned to them with gusto.

At 10:36 A.M. the same officer who read the questions to them returned. He had with him two thin plaques.

"What's this?" asked Slick between bites of beef pot roast, as he was handed his plaque.

"An extract of the Criminal Code," said the inscrutable mask of the officer as he handed the other plaque to Poxie. "As it applies to you during the trial." Again, he did an about-face and left.

Said Slick, munching loudly, scanning the plaque given him. "Wow, room service and all. Now they give us reading material with our food." He munched on. "Hey," he said, as if coming upon a gem, "did you know, Friend Poxie, it ain't against the law to mess around with the innards of a null-vehicle?"

"No?" said Poxie, tearing at a chicken drumstick, scanning his reading material. "Why not?"

"Because," said Slick. Then he stopped to chew some more. "Nobody ain't ever done it before. So how are you going to make a law about a crime that can't be committed?"

"I dunno. How?"

"Except it's been committed, Nit!" said Slick with a grin. "Don't you see? Me, Slick, I'm the first one that ever messed with the innards of a null-vehicle. Me."

Poxie was sugaring his coffee as he said: "Then how is it," he took a sip, "that you're here?"

Slick's face dropped a couple of notches. "Oh, they're getting me on an old, old law, statute they call it." He read ". . . Contributing to a felony or being a party to a felony." He looked up. "See, they got ya one way or another. Hey, how about yours? What's yours say?"

Poxie pursed his whole face in reading the thin plaque. "I dunno. Whole bunch of mish mash. Words I never saw, like, ah, well, like eugenics. What's eugenics?"

"I dunno."

Poxie read for a few more minutes. "Well, how about"—scanning his plaque hard and sipping his coffee—"genetics."

"Genetics?" asked Slick brightly. He lay full length on the divan, his meal finished.

"Yeah."

"That's your folks, your mother, father, your grandmother, grandfather, all the way down the line."

"Oh," said Poxie and pushed his plate away; he couldn't finish. He was looking at the wall chronometer which read 10:46 A.M. when the same officer who had visited before entered with the announcement.

"Your trial," he said to both of them, "is over."

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When Poxie and Slick had absorbed this news, he continued. "The Tribunal of the State of Kansas . . . finds you Guilty!"

Then came the long reading-out by the officer, as per procedure, ample material for this having been brought along.

"You, Mr. James Smith, First Defendant, according to the criminal code of this State, Article 29, are convicted of, due to criminal negligence, the manslaughter of Cynthia Marie DeSantis, a minor of eight years of age, on May the 8th, ten-oh-one A.M., at Churchill City, Kansas.

"And you, Mr. Rodney Cooper, Second Defendant, are convicted of a lesser count of contributory manslaughter of the same Cynthia Marie DeSantis, in that you, by your own voiced admission, caused —by mechanical manipulation of Drive and Control systems of a null-vehicle, Mark Nine Phaeton, License number EV 30899, Chicago, Illinois, owned and operated at the time of the occurrence by Mr. James Smith, First Defendant— and enabled this same vehicle to dip below the authorized height for civilian vehicles of this type traversing Alpha Roadways and thereupon bringing about the demise of the said Cynthia Marie DeSantis."

The green-helmeted officer took a couple of breaths and continued. "The accumulation of evidence leading to the conviction of First and Second Defendants, Mr. James Smith and Mr. Rodney Cooper, is as follows:

"An indication of occurrence from triangulation sensors at east-west, Route One Hundred and Three Roadway, Co-ordinate B-Four-One-One, which is at Churchill City, Kansas, and accordingly tracked by these same sensors until apprehension was accomplished. It must be stated now to present Defendants, an indication of occurrence by triangulation sensors does not, by itself, constitute evidence. Only a tributary to such evidence.

"The fact of blood found on the seized vehicle of Mr. James Smith did, indeed, match that of the decedent, Cynthia Marie DeSantis.

"A playback from the Accumulator of the vehicle of Mr. James Smith showed that indeed there had been a traversing at heights below that authorized, namely one half a meter from the ground, at point of impact, at a time coinciding with that recorded by the Roadway triangulation sensors, at a time of ten-oh-one A.M., 8th of May.

"The fact of a brief stop immediately following time of occurrence, as recorded by triangulation sensors.

"The fact of traveling at an excessive rate of speed following this recorded impact and stopped by Police Retriever Vehicle oh-oh-nine.

"As further substantiation of the guilt of and a proof of lessened

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probability that this may have been a freak occurrence, a playback of the Accumulator on the vehicle of James Smith shows many such below-authorized height travels, besides other dangerous practices: overspeeding, too rapid level changes and illegal mid-roadway stops.

"The hypothesis of whether James Smith and Rodney Cooper, the occupants of involved vehicle when seized, were the same occupants of involved vehicle during time of occurrence, ten-oh-one A.M., May 8th, becomes highly substantiated theory. One: when seen that the post-occurrence speed of involved vehicle was too high to permit disembarkation and change-over of occupants. Two: the fact that involved Police Retriever Vehicle oh-oh-nine noted no such change on its scope. Three: an unseized upon opportunity to deny involvement in the occurrence by the First and Second Defendants in a play-back of conversation from Police Retriever Vehicle oh-oh-nine."

The green-helmeted, translucent-masked officer lowered his clipboard. "That," he said, "sums up all the evidence toward you, Mr. Rodney Cooper." Slick seemed to relax.

"Oh, you mean that's all," said Slick facetiously.

The officer directed this next at Poxie. "However, there's additional evidence against you, Mr. James Smith." He raised the clipboard. "In that James Smith, Personal Identification Ex-I-Ex, residence eight-one-one Church Street, Chicago, Illinois, had been operating his vehicle on an Option License, due to a history of the grandfather of James Smith, Beauregard Smith, by name, who was adjudged mentally incompetent and unsane, post-occurrence to a driving mishap that took two lives. The case of Beauregard Smith had been relegated to the Authority of the Federal Eugenics Program and an apt notation officially made in regard to the offspring of Beauregard Smith." He lowered the clipboard and asked, "Your father wasn't allowed to drive, right?"

"Right," said Poxie.

"And you were only allowed to drive under an Option?" a question which Poxie did not answer.

"Is that it?" asked Slick, laying back on a divan, chewing on a toothpick. The officer nodded.

"What's next?"

"Sentence," said the green-helmeted officer. Slick sat up in one piece suddenly, and Poxie looked at the chronometer. It read 10:49 A.M.

"Of course you do know," said the officer, "that a complete rundown of all this goes to your immediate relatives. Also, a notification to employers, lodges and associations, debtors and creditors."

"Mostly creditors," said Slick. And Poxie had to grin. Then, Slick

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snapped his fingers impatiently. "Come on, Sentence."

The officer dutifully took to his clipboard and began to read. "Due to the involvement of Rodney Cooper in a fatal accident, his driver's license is hereby revoked . . . Forever."

Slick didn't seem fazed. "How about him, Poxie here. His license revoked?" The officer presented a blank mask and didn't answer. "Well," admonished Slick, "How about him? His license revoked?"

The officer answered, "Yes, it's revoked." He resumed reading. "It is the contention of the Tribunal that brilliance of any kind be allowed to perpetuate and that Rodney Cooper, showing proof of a high degree of mechanical aptitude, be allowed to serve where he may be most useful; the Lunar Observation Laboratory . . . for a period of one year."

Poxie winced at the "year on the moon" bit, but Slick went, "Yeow, the moon! I drew the moon!" He actually jumped up.

The officer pointed to one of the doors. "Would you leave now, please," he said to Slick. The addressee looked confused. "The left door," said the officer.

Slick dashed out, yelling, "Be good, Poxie. Take care of yourself, Bo. See you now," and he was gone.

The chronometer read 10:50 A.M.

"And you, my lad, go through the right doorway," said the inscrutable mask of the green-helmeted officer.

As Poxie made to comply, the officer called after him. "Oh, you will be allowed one phone call."

Poxie didn't answer, just kept right on walking.

"You will also be given counsel."

Poxie stopped, puzzled. "Counsel?" He looked at the officer. "Counsel? Now?" He made a face.

"Just go through the right doorway."

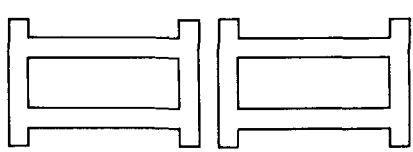
Poxie went through the indicated doorway at 10:51 A.M.

At 10:59 A.M. he kissed the crucifix.

At 11:00 A.M. James (Poxie) Smith was vaporized. ■

These are perfectly correct mechanical drawings of an object—top and front views. The third view will be published next month. If you can figure it out, you can give yourself a Gold Star—and you'll know why three, not two views, are standard!

WHY DRAFTSMEN USE THREE VIEWS



top *front*

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PROTOTAPH

This is a sort of guessing-game challenge story. Under what circumstances would a man be absolutely, totally uninsurable? Even with a 100% premium . . . ?

KEITH LAUMER

I was already sweating bullets when I got to the Manhattan Life Concourse; then I had to get behind an old dame that spent a good half hour in the Policy Vending Booth, looking at little pieces of paper and punching the keys like they were fifty-credit bet levers at the National Lottery.

When I got in, I was almost scared to code my order into the Vendor; but I was scareder not to. I still thought maybe what happened over at Prudential and Gibraltar was some kind of fluke, even though I knew all the companies worked out of the Federal Actuarial Table Extrapolator; and Fate never makes a mistake.

But this had to be a mistake.

I punched the keys for a hundred thousand C's of Straight Life; nothing fancy, just a normal workingman's coverage. Then I shoved my ID in the slot and waited. I could feel sweat come out on my scalp and run down by my ear while I waited. I could hear the humming sound all around me like some kind of bees bottled up back of the big gray panel; then the strip popped out of the slot, and I knew what it said before I looked at it:

UNINSURABLE.

I got the door open and shoved some guy out of my way and it was like I couldn't breathe. I mean, think about it: Twenty-one years old, out in the city to take my chances all alone, with no policy behind me. It was like the sidewalk under your feet turned to cracked ice, and no shore in sight.

A big expensive-looking bird in executive coveralls came out of a door across the lobby; I guess I yelled. Everybody was looking at me. When I grabbed his arm, he got that mad look and started to reach for his lapel button—the kind that goes with a Million Cee Top Crust policy.

"You got to listen," I told him. "I tried to buy my insurance—and all I got was this!" I shoved the paper in his face. "Look at me," I told him. "I'm healthy, I'm single, I finished Class Five Subtek school yesterday, I'm employed! What do you mean, uninsurable?"

"Take your hands off me," he said in kind of a choky voice. He

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was looking at the paper, though. He took it and gave me a look like he was memorizing my face for picking out of a line-up later.

"Your ID," he held out his hand and I gave it to him. He looked at it and frowned an important-looking frown.

"Hm-m-m. Seems in order. Possibly some, er . . ." He pushed his mouth in and out and changed his mind about saying it; he knew as well as I did that the big actuarial computer doesn't make mistakes. "Come along," he turned his back and headed for the lift bank.

"What have I got, some kind of incurable disease or something?" I was asking them; they just looked at me and goggled their eyes. More of them kept coming in, whispering together; then they'd hurry away and here would come a new bunch. And none of them told me anything.

"The old crock in front of me, she was ninety if she was a day!" I told them. "She got her policy! Why not me?"

They didn't pay any attention. Nobody cared about me; how I felt. I got up and went over to the first guy that had brought me up here.

"Look," I said. I was trying to sound reasonable. "What I mean is, even a guy dying in the hospital can get a policy for *some* premium. It's the law; everybody's got a right to be insured. And—"

"I know the laws governing the issuance of policies by this company," the man barked at me. He was sweating, too. He got out a big tissue and patted himself with it. He looked at a short fat man with a stack of papers in his hand.

"I don't care what kind of analysis you ran," he told him. "Run another one. Go all the way back to Primary if you have to, but get to the bottom of this! I want to know why this"—he gave me a look—"this individual is unique in the annals of actuarial history!"

"But, Mr. Tablish—I even coded in a trial run based on a one hundred per cent premium, with the same result: No settlement of such a claim is possible—"

"I'm not interested in details; just get me results! The computer has available to it every fact in the known universe; see that it divulges the reasoning behind this . . . this anomaly!"

The fat man went away. They took me to another room and a doctor ran me through the biggest med machine I ever saw. When he finished I heard him tell the big man I was as sound as a Manhattan Term Policy.

That made me feel a little better—but not much.

Then the fat man came back, and his face was a funny white color—like some raw bread I saw once on a field trip through Westside Rationing. He said something to the others, and they all started to talk at once, and some of them were

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yelling now. But do you think any of them told me anything? I had to wait another hour, and then a tall man with white hair came in and everybody got quiet and he looked at papers and they all got their heads together and muttered; and then they looked at me, and I felt my heart pounding up under my ribs and I was feeling sick then, med machine or no med machine.

Then they told me.

That was two days ago. They got me in this room now, a fancy room up high in some building. There're guys around to do whatever I want —servants, I guess you'd call 'em. They gave me new clothes, and the food—West Rat never put out anything like this. No liquor, though—and no smokes. And when I said I wanted to go out, all I got was a lot of talk. They treat me—careful. Not like they like me, you know, but like I was a bomb about to go off. It's a funny feeling. I guess I got more power than anybody that ever lived—more power than you can even get your mind around the thought of. But a lot of good it does me. There's only the one way I can use it—and when I think about that, I get that sick feeling again.

And meanwhile, I can't even go for a walk in the park.

The president was here just now. He came in, looking just like the Tri-D, only older, and he came over and looked at me kind of like I looked at him. I guess it figures: There's only one of each of us.

"Are you certain there's not some . . . some error, George?" he said to the wrinkly-faced man that walked just behind him.

"The Actuarial Computer is the highest achievement of a thousand years of science, Mr. President," he said in a deep voice like the mud on the bottom of the ocean. "Our society is based on the concept of its infallibility within the physical laws of the Universe. Its circuits are capable of analyses and perceptions that range into realms of knowledge as far beyond human awareness as is ours beyond that of a protozoan. An error? No, Mr. President."

He nodded. "I see." That's all he said. Then he left.

Now I'm just sitting here. I don't know what to do next—what to say. There's a lot to this—and in a way, there's nothing. I got to think about it, dope it out. There's got to be something I can do—but what?

The machine didn't say much. They took me down to the sub-vault where the big voice panel is located and where the primary data goes in, and let me hear for myself. It didn't give any explanations; it just told me.

Funny; in a way it was like something I've always known, but when you hear Fate come right out and say it, it's different.

When I die, the world ends. ■

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the reference library

P. Schuyler Miller

The Resurrection of Homer Eon Flint

The generation who, like myself, discovered science fiction just before Hugo Gernsback published the first issue of *Amazing Stories* (April, 1926), soon learned from the more experienced fans that there had been "classic" writers in the years B.A. Librarians knew nothing about them; their stories had appeared in the popular magazines of the time and rarely achieved the dignity of hard covers. If they were published as books, they lacked the *imprimatur* of the literary judges, and the librarians would have none of them.

Homer Eon Flint was one of these "lost" masters. Veterans insisted that his stories were as good or better than those by the "name" writers who did make the transition from *Argosy* or *Blue Book* or were reprinted by Gernsback. One or two of his stories did turn up in the early years of *Amazing Stories*, but not the best-remembered. Now Donald Wollheim, a connoisseur of those good old days, has resurrected four of Flint's stories in two Ace paperbacks: "The Lord of Death and the Queen of Life" (Ace No. F-345; 143 pp.; 40¢) and "The Devolutionist and the Emancipatrix" (Ace No. F-355; 191 pp.; 40¢). In both titles the "and" separates two novelettes in a series originally published in *Argosy All-Story Weekly* in 1919 and 1921.

To anticipate the question: of course the stories are "dated," but not as much as you'd think. Conventions in the 1920s were not today's, but Flint seems to have had a more knowledgeable attitude toward science and technology than his fellow writers of "different" stories for the Munsey magazines, and in all four of these yarns he was handling sociological themes smoothly and knowingly.

The four stories are the adventures of a doctor, a geologist, an architect and an engineer who in the first book travel to Mercury and Venus in a cubical "sky car" and in the second "visit" planets of two distant stars by a telepathic technique they learn from the hy-

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per-civilized people of Venus. Flint evolved a theory that probably wasn't original with him: planetary atmospheres were dielectrics that insulated the habitable surface from a highly charged interplanetary "ether." Lightning, on this theory, was a spark produced by momentary breakdown of the insulation, and Flint's inventory simply tapped the supposed etheric reservoir of power to propel his spaceship.

On Mercury, in "The Lord of Death," the travelers found the relics of a war-prone civilization that had bludgeoned itself to destruction. Coming at the end of what Sprague de Camp calls "the Kaiser's War," the parallel was obvious—and still is. In this story, Flint's design for spacesuits sounds remarkably like the real thing, except that communication was by telephone cable rather than radio. In "The Queen of Life" the voyagers find Venus covered by a single roof and an advanced, overcrowded society. Parthenogenesis gives the feminists an excuse for getting rid of the males and cutting the population in half.

"The Devolutionist" and "The Emancipatrix" are more advanced "what if" stories that combine strange planets and strange societies. Using the Venusian telepathy, our four wanderers can project their awareness into the bodies of other intelligent beings, far out across the galaxy. Flint showed a great deal of ingenuity on both scores, though Hal Clement would probably object to his physics.

On a world of Capella they find two planets revolving around a point of contact, with a static society which makes one planet the parklike resort of the ruling class, while industry and slums are isolated on the second world. So long has this situation continued that the very thought of change is almost unthinkable.

Then, on a disc-shaped planet of Arcturus, they find a cattle-like human race dominated by intelligent bees . . . and on the "bottom" hemisphere the remains of an advanced human civilization that has also obliterated itself by war. By trying to communicate the secret of fire, our meddlers attempt to upset this strange and strained balance.

Homer Eon Flint would have been right at home in Astounding if he had lived another twenty years, instead of dying under very strange circumstances in 1924. I think he'd have been one of the bright lights of John Campbell's constellation as he actually was of Bob Davis's.

TRICON—'66

It's not too early to give you the fundamental facts about the 24th World Science Fiction Convention, to be held in Cleveland, Ohio, on September 2, 3, 4 and 5, 1966. This one is calling itself the "Tricon," because it will be the joint production of three very active fan groups

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in Detroit, Cincinnati and Cleveland, all of whom have put on exceptionally successful conventions before. (The first I ever managed to attend was Cleveland's in 1955.)

Convention headquarters will be the Sheraton-Cleveland Hotel, focus of all transportation routes, with twenty-four-hour restaurant service handy for those all-night discussions of galactic affairs. The Tricon officially opens Friday night, September 2nd, and runs through the Labor Day week end, but there will be a warm-up session for early arrivals on Thursday night. (All three hosts are notable party-givers.)

Guest-of-honor and banquet speaker will be L. Sprague de Camp, whose earliest and best science fiction and fantasy was published here in Astounding and in the lost *Unknown Worlds*. Luckily, the paperbacks keep it in print, for nowadays he is devoting himself to popular/scholarly books and historical fiction.

Membership fee is $3.00 if you attend the Tricon, $2.00 if you simply want to keep in touch—you can pay the extra dollar if you do make it to Cleveland. This will get you three progress reports and the Tricon program. Send it to: 24th World Science Fiction Convention, P.O. Box 1372, Cleveland, Ohio 44103.

I'll report the rules for the "Hugo" awards when I get them from the Committee. Probably nominations will be accepted from all and sundry, but convention members will vote on the awards.

BEYOND TOMORROW
Edited by Damon Knight • Harper & Row, New York • 1965 • 333 pp. • $4.50

One of the self-imposed roadblocks in the path of science-fiction anthologists is the rule that they can't use any story that has been reprinted before. Sometimes exclusive reprint contracts make this necessary, and sometimes it's good sense. At any rate, in this collection Damon Knight has passed the hurdle by simply kicking it out of the way.

All of the stories in "Beyond Tomorrow" are good, all of them are representative of good science fiction, and all of them are familiar to veteran readers. This is a collection that the new reader must read, and that public libraries would do well to stock in depth to supply the newcomers and replace out-of-print anthologies.

Six of the ten stories were first published in this magazine, between 1934—when John Campbell, as "Don A. Stuart", wrote a parallel to the vision of the far future in Wells' "Time Machine," called "Twilight"—and 1957, when Astounding had Kate Wilhelm's yarn about the victim of a traffic accident who telepathically visits "The Mile-Long Spaceship" that is trying to find and destroy Earth. The oth-

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ers were Robert Heinlein's memorable "Coventry," a sequel to his novel of a theocratic culture of the future, "If This Goes On. . ."; A. E. Van Vogt's short, idea-packed "The Seesaw," on which he built two of his best books about the Weapon Shops and their war with the Isher Empire; Isaac Asimov's memorable "Nightfall," about a people who have never known darkness; and Clifford Simak's "Desertion," which may have been the first and is certainly one of the best of the stories in which men explore Jupiter in the mind and body of a Jovian animal.

As for the rest, I had forgotten that Arthur C. Clarke's short story, "The Deep Range," beautifully epitomized the sub-sea herding that he expanded into the novel of the same name. He is at his realistic best in a strange world here on Earth. Alan Nourse's "Brightside Crossing" is an adventure story that, as Damon Knight points out, might have been done for the *National Geographic* in the good old days before that venerable journal became a staff-written picture book. Ray Bradbury's "The Million-Year Picnic" takes us to a Mars that never was, and that doesn't even agree with the other episodes of "The Martian Chronicles," but still has in it all the elements of Bradbury's best work, still not wholly choked by style. Finally, "Happy Ending" by the late Henry Kuttner is an intricately constructed and deceptively plotted time traveling story.

No recent anthology has maintained so high a level.

THE X FACTOR

By Andre Norton • Harcourt, Brace & World, New York • 1965 • 191 pp. 1 $3.25

Like Robert Heinlein before her, Andre Norton is letting her science-fiction books for young adults drift further and further out of the teenage class and closer and closer to her adult paperback stories. This is one of her best, and if you have refused to read the others because their heroes are young, that fact is less obtrusive here.

Diskan Fentress is the hulking, slow-thinking son of a space explorer, born of a casual mating-of-convenience and unable to fit into the delicately super-civilized society where his father later settles down. He steals a spaceship and runs away, to crash on an unexplored world where some very peculiar things are going on. These make the story—an unfinished story, as it happens.

The world where Diskan finds himself is a bleak and hostile one, yet he soon finds evidence that there have been other human visitors. He is led to a ruined city by the Brothers in Fur, otterlike creatures with whom he can establish a kind of mental rapport, and who need his help for a purpose that is not clear when the book ends. In the city he

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finds survivors of an exploring expedition, and is attacked by outlaws.

Very simple? Very old-fashioned? Very juvenile? Maybe—but nobody evokes strange worlds as Andre Norton does, and nobody has so developed the art of suggesting more than she says, so that the reader must—as Robert Nathan has said in "The Mallot Diaries" "kill his own mammoth."

PRELUDE TO MARS

By Arthur C. Clarke • Harcourt, Brace & World, New York • 1965 • 497 pp. • $4.95

While Arthur Clarke basks at the bottom of the Indian Ocean, his publishers continue to turn out omnibus collections of his old stories that read just as well as they ever did. When haven't Clarke stories been worth a penny a page?

You may have missed the reaction in Government circles to the beautifully sharp photographs of strange corners of the Earth that the Gemini team made with an ordinary Hasselblad camera. Suddenly space stations, which everyone had written off as a waste of time and money, are back on the high-priority program. A man with a good camera, in orbit over Russia, China, Africa, South America, can photograph detail that the best flying TV cameras we have just can't pick up and send back.

"Prelude to Space" was Clarke's short, but convincing, 1947 account of the British attempt to send a man to the Moon. He hasn't changed it, and many of the details are quite different from the actuality we will see well before his schedule, but you'll be fascinated with how truly he foresaw what must happen.

"Sands of Mars" is a slightly longer and equally documentary novel about the first expedition to Mars, via the space station. This kind of Mars probably doesn't exist —*Mariner*'s initial data pretty well nail that down—but you'll believe Clarke's version.

For good measure, and to flaunt the author's versatility, you get sixteen of his best short stories: eight light yarns told at the "White Hart," and eight prime examples of serious SF. All for a penny a page!

NOT WITH A BANG

By Chapman Pincher • New American Library, New York • 1965 • 248 pp. • $4.95

This is the first novel of a British scientist and science writer, and a good one. The melodrama, which the author would have had to use as the skeleton of his plot if he had been writing a serial for a science-fiction magazine, is replaced by the personal story of the people who develop and use a rejuvenation drug, seen against the political struggle in which England and the world go down whimpering.

The people are believable: we've all met them. So are the situations.

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Even without the element of Russian espionage, which does bring the plot to its final climax, the story would move with the inevitability —to use a familiar Pittsburgh simile—of a steel truck whose brakes have failed on a hill. Once Robert Harvey and his assistant have discovered that a certain preparation not only delays the senility of laboratory animals, but seems to perk them up, it is obvious that someone will find a way to exploit their drug. A go-getting reporter who shares the bed of Harvey's assistant . . . a series of big-name scientists with an eye open for more honors . . . aging politicians: all of them want SP47—and so do the world's aged.

They get it, and the social troubles that the politicians saw and decided to ignore begin to snowball. And then it turns out that SP47 sensitizes its takers to radioactivity. Knowing this, the Soviets begin a series of "bomb tests" that blanket the world with fallout.

As a one-time scientist and prominent science writer, Chapman Pincher makes his biomedical talk and his talkers sound real. His politicians are types as familiar in the United States as in England. The contorted polygon of his characters' relations is by no means realistic. You might, in fact, say that this novel is to the standard SF immortality-drug story as "The Spy Who Came In From the Cold" is to James Bond.

REPRINT SHELF

THE TWO TOWERS

By J. R. R. Tolkien • Ace Books, New York • No. A-5 • 1965 • 813 pp. • 75¢

THE RETURN OF THE KING

By J. R. R. Tolkien • Ace Books, New York • No. A-6 • 1965 • 381 pp. • 75¢

The two completing volumes of the greatest adventure fantasy of our time. Ace's major service for 1965 is the reprinting of these three books, complete right down to the appendix in "Return of the King." You must, of course, begin with A-4, "The Fellowship of the Ring" —and I do mean *must*.

GREYBEARD

By Brian Aldiss • Signet Books, New York • No. P2689 • 1965 • 207 pp. • 60¢

The English writer's last year's novel about life in England after the "accident" that destroyed civilization. Odd and good.

THE DUPLICATED MAN

By James Blish & Robert Lowndes • Airmont Books, New York • No. SF8 • 1965 • 128 pp. • 40¢

Old (1953) and minor adventure yarn.

AFTER THE RAIN

By John Bowen • Ballantine Books, New York • No. U2248 • 1965 • 158 pp. • 50¢

Reissue of one of the better British cataclysm yarns—one of the Ballantine originals of 1959.

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brass tacks

Dear Mr. Campbell:

After reading two chapters of R. V. Cassill's "Writing Fiction" (Permabook Edition # M-7508, in case you'd like to obtain a copy), I was drawn back to your October editorial. Mr. Cassill's book represents the litterateur's position very well—no "exotic situations" or "cardboard heroisms" as he puts it.

I believe that a parallel can be drawn between the existing situation in literature and that of American popular music. An Austin, Texas, columnist recently stated that jazz is no longer the music of the masses because it has evolved into an art form—what was once a happy-go-lucky means of expression is now an introspective, moody, esoteric endeavor. As a result, the "common man" has turned to the discotheque parlor to let down his hair.

See the similarity? So-called serious literature is an art form, and science fiction, fantasy and sensational fiction—forgive me for lumping them together—are entertainment. Art is primarily *appreciated*—by a minority—whereas entertainment is *enjoyed*—by the majority of the buying public.

"Serious" literature, like jazz, has simply come of age, and in doing so has lost most of its following.

DANA LOCKLER
1210 St. John's Street,
Austin, Texas
"Art," of course, with a capital A!

Dear Mr. Campbell:

As a literature graduate who has sold you a couple of stories, and who has himself taught literature, I read your October editorial with deeply mixed feelings. Much of what you say is dead on target, but most of the rest is megamiles off base.

It is a truism that something is seriously wrong with our critics and literature teachers. Thirty years ago as a college freshman I innocently questioned a professor's statement about E. A. Poe and was squelched. After class, not so much to apologize as to try to figure out the score, I diffidently stated that my question had been based on an essay by Poe himself.

The professor's response: "You don't have to quote *anybody* to me; I'm *familiar* with Poe!" sent me scampering to the registrar's office to switch my major from English to engineering. Unfortunately, it's not all that easy to switch majors in midterm, and the resulting mess removed me from academe for a quarter century.

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Literature, of course, is at least as factual as solid state physics, psychiatry, or cosmology. There is room in geology to argue whether granite is a truly igneous rock, and whether all the present continents are drifting away from a single protocontinent. In physics one may speculate that there are two kinds of neutrino—both having neither charge nor mass—and then wonder how to tell them apart. There is the same amount of latitude in literature to wonder whether Hamlet is really in love with his mother, whether one or six persons wrote the Homeric epics, and whether Wordsworth was actually a pantheist.

Unfortunately, the main body of critics and literators accept no such limitations. For every so-called expert who truly studies a work, there are dozens who rush instead to study the critical writings of a dozen other so-called experts. The obvious result is that literature at least gives the illusion that it is what these odd people say it is. The same is obviously true of the abstract criteria for the evaluation of literature.

On the other hand, please back up a continent or two regarding writers who polish and repolish their work. You mention the Odyssey and allude to the Beowulf, Roland, and Nibelungen epics. Dirty pool; every one of them came down through oral tradition, with every bard polishing and repolishing a little bit. Shakespeare—all evidence indicates that he rewrote and polished at every chance he got, so much so that at least one of his plays (I believe that it is "King Henry V") exists in at least two substantially different versions.

I forget how often FitzGerald revised his immortal translation of the "Rubaiyat." W. Somerset Maugham, the only modern mainstream writer whom I would bet on as at least a minor entry in the literary immortality sweepstakes, said, "There is no such thing as good writing; there is only good rewriting."

Returning to the teaching and evaluation of literature, I fear that we have allowed this branch of knowledge to fall into the clutches of the self-proclaimed experts. Surely posterity—if any—will remember ours as the era of the self-proclaimed expert.

My first encounter with this breed was in Occupied Vienna at the close of World War II, where our headquarters had set up a modest but functional free bus system for Americans, their families, and visiting Allies. Then the experts descended. For several weeks there were swarms of buses cruising in all directions, and it really was the least bit easier to get from place to place. Then all the buses broke down, and I began learning streetcar routes.

I could continue almost indefinitely, but one example suffices.

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In our federal capital there is a self-proclaimed Fine Arts Commission. One of the buildings which it approved was the notorious new Senate Office Building. It also approved a starkly hideous Roosevelt memorial, but fortunately there was such an outcry of disgust and loathing from the people that the ghastly thing was—I hope—permanently dropped.

And there we are. Our literature is judged and taught by a mutual admiration society of self-proclaimed experts. The pity of it is that in past ages there was always room in print for every good contender. A poet like John Donne could—and did—run afoul of the critics and yet survive in print until later ages recognized him. In his own time, Shakespeare was just another playwright.

With the present savage competition to get into print, and the presses controlled as never before by the self-proclaimed literary experts, it is all too obvious that today, a John Donne or a Walter Savage Landor or a John Keats has a vanishingly small chance for recognition after today's literary swill has been tossed into tomorrow's garbage.

LAWRENCE A. PERKINS

Sure some men do write and rewrite —my protest is against the proposition that ONLY rewriters make Literature.

Dear JWC:

It is seldom that I write a letter immediately after reading an editorial, but I cannot restrain myself this time! "The Nature of Literature" was needed for some time; however, you are in the unfortunate position of telling the wrong people. After all, the Litterateurs are not the type to read science fiction (or, for that matter, anything outside their special continuum), hence, the chance that they will ever read your editorial is practically zero.

Besides—they will disagree with you. F'rinstance, "Hamlet." You ask what the sex interest is in "Hamlet." Well, hold onto your hat—when I was taking an undergrad course in college, I was told that the underlying (and sexual) motivation in Hamlet was that the unhappy prince had an Oedipal fixation on (of course) his mother, which was the *real* basis of his mental conflict and turmoil. My personal opinion to that suggestion can't be printed (except in Literature), but that is only because I cannot appreciate the True Subtle Nuances of that great work—I'm just a clod, you see, having studied stuff other than English Lit.

But then—after all, several Litterateurs are convinced that Bacon or Marlowe wrote Shakespeare; of course these two were educated, literate men.

Now, of course, there's plenty of Sex in great Literature. After all, Odysseus had quite a time with a few females in his trek. Also, the legends of King Arthur involved mostly the stories of Launcelot and

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Gwynevere, Tristam and Isult, and the results of pervious lusts, incests, and adulteries (Arthur himself was the result of Uther Pendragon's lust for Queen Igraine who Uther sleeps with after being transformed into the likeness of her husband, the Duke of Tintagil, by Merlin. Merlin is trapped by his mistress Nyneve or Vivienne. Arthur is critically wounded—perhaps killed—by his bastard son, Sir Modred, whom he begot by Queen Margawse—who may have been his half sister. Et cetera.

But . . . sex isn't everything, and the most wonderful tale in the *Morte D'Arthur* is not the triumph of sex, but its denial. I mean "The Tale of the Sangreal." Sir Galahad, though the bastard son of Lancelot and Elaine, was himself a blameless virgin who was granted the achievement of the Holy Grail and was transformed . . . elevated . . . to a spiritual plane impossible to the sinful knights. Odysseus' great adventure was his voyage, not his dalliances.

The trouble with Litterateurs is that their judgment is completely subjective. They have trained themselves that certain types of writing are superlative, and since their subjective judgments are derived from their training . . . they have trapped themselves in a vicious circle.

I think that one of the reasons for success in anything is that you do it not only because you like to (this is important, of course), but also because you have to in order to make a living. An English Lit student is often taught about the symbolism in a work, its message, and its social impact. The fact that a work is a story is many times incidental. Plot development? What's that? Characterization? Well, maybe, if everybody is obsessed with abnormal (but not uncommon) desires.

Sure. That's why the only ones who appreciate most of contemporary Literature are contemporary Litterateurs. And if you asked most of them, they would maintain that "Alice in Wonderland" was written only for children, although that work will outlast most contemporary Literature.

The editorial was great, but those who listen are not those who ought to be told. Regrettably, Litterateurs are *certain* of a Great Truth, and the facts you cite won't change their minds.

As an occasional writer myself, however, I say bravo!

STEPEN A. KALLIS, JR.

1. Nobody ever suggested that the heroes of the great stories were sexless! But the old authors distinguished between a monomanic dedication to eroticism, and having a joyful interest in all of life.

2. I know the Litterateurs won't read, or agree in any degree whatever, with what I said—but there'll be 100,000 needlers who have read it, and will tend to spoof their Authoritative Pronunciamentos now.

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should be most rigorously and actively investigated.

But not thalidomide! Oh, no! That's that awful-horrible-terrible stuff that causes pregnant women to have deformed babies, so we can't *possibly* give that awful stuff to a helpless eighty-five-year-old woman in terminal cancer, can we? Or to a man stricken with cancer of the lung?

Look—there are a thousand standard pharmacopoeia drugs that are strongly contraindicated in pregnancy. Good and useful drugs which the medical profession routinely uses, except in the case of pregnancy.

There are hundreds of drugs—and foods, even!— that are known to have considerable B-vitamin-destruction activity. Several kinds of fish, for instance, contain substances which destroy B vitamin.

So what's so different about thalidomide?

Publicity, of course. And it's new. The combination makes the public react—and, therefore, politically-sensitive bureaucrats react—in an irrational manner. Like the strong public reaction to the idea of gas being used to force Viet Cong's out of tunnels with their civilian hostages. Oh, how wicked! How awful! They should have done something that didn't involve modern chemistry, like pouring boiling oil down on them, or an ancient sulfur-and-pitch torch. That would be decent, because it's been done for millennia. It would, of course, have killed a lot of people, but that would be proper because the method is traditional. But using chemically purified, non-lethal irritants instead of a mixed bag of toxic, carcinogenic, and irritant stuff—*that* was immoral and wicked.

The human reaction to thalidomide is unique; in all the tests made on animals, no one found any way to induce the human type response in any mammal. Using a dosage some twelve hundred times the human dosage, some effect was produced in pregnant rabbits—but the effect was not the same type.

On the other hand, the thalidomide-type effect was produced in mice, using another drug. The mouse-distorting drug, however, is one the FDA can't do much about; it's too traditional. Otherwise, no doubt, it would have been declared absolutely illegal, barred from the United States, and all chemically similar materials absolutely banned.

The amount of caffeine in a cup of coffee or a cup of tea does to mice what thalidomide does to B-deficient women. In humans, caffeine is the best all around stimulant known, with no deleterious side effects known. (The so-called

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"coffee nerves" simply result from the individual being in a state where stimulation is precisely what he does *not* need. And, of course, individuals can always be found who are allergic to practically anything you name.)

Then there's that deadly drug, penicillin. Try it on guinea pigs—it's obviously a lethal substance, because it kills 'em all. And it's *not* an allergic response; guinea pig metabolism is completely fouled up by penicillin.

Now a good, solid, all-out campaign of publicity, showing that penicillin kills guinea pigs regularly, and a newspaper-headline shriek about how greedy drug companies are seeking to impose this vicious, dangerous drug on people—plus a few hundred cases of human allergic reactions to the stuff—and penicillin could be legislated off the market.

Not now, of course—now we have too much background experience with it as the tremendous lifesaver it is. And the FDA never had a chance to attack it; the Armed Forces developed it and used it massively during the war, and they, of course, could, and routinely did, tell the FDA and any other Federal bureaucracy to keep their irritating little fingers the blazes out of the way; there's a war to fight, and don't get in the way.

Give a rational reason why the Army, Navy and Air Force *men* should be denied the use of thalidomide when needed!

Or why individuals of either sex should be denied this highly useful medication when they're over fifty-five. Or in terminal stages of cancer?

But then . . . the AMA and FDA have a peculiar attitude toward anything that appears to affect cancer. Why, I don't know. The business of Krebiozen and Dr. Ivy, for instance, is highly interesting. The FDA attacked Krebiozen almost purely by their standard trial-by-publicity in newspapers and magazines. Now, at this writing, the Chicago trial of Krebiozen, Dr. Ivy and Dr. Durovic is still in progress. I can, I think, readily predict what will happen.

Dr. Ivy & Co. will be convicted. They'll be convicted because they are provably guilty *of violating an FDA ruling.* The indictments against them, however, include charges of fraud, mulcting the public, conspiracy, a dozen other things having to do with the proposition that Krebiozen is a valueless and ineffective material.

Those charges cannot be proven; the evidence is completely inadequate either way. The FDA's spectroscopy tests are about as conclusive as having somebody taste the stuff and decide whether it's effective.

The FDA's beautifully effective trick, however, depends on the fact that the FDA has the legal power to declare any food or drug ineligi-

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ble for interstate shipment. They so declared Krebiozen. Then any shipment of Krebiozen, *whether it is in fact the absolute and perfect cure for cancer or not,* is, by definition, an illegal act.

Suppose you are arrested and tried for six "crimes"—assault and rape, murder, setting the orphan's home on fire, poisoning the city reservoir, and illegal parking. At the trial you prove that nobody was assaulted, the alleged rape victim died six years earlier, the orphan's home hasn't been burned, and the city reservoir isn't poisoned any more than usual by upstream sewage.

So you're found guilty, because you *did* park your car ten minutes longer than the one-hour limit.

Now properly handled by effective publicists, the trial will be given great newspaper attention. After all, it sure sounds like a juicy one—assault, murder, arson of the orphan's home . . . gee! The trial drags on—there's a lot of publicity. People get a bit bored. Finally the conclusion is reached, and the headlines say, "Guilty in Crime Trial!"

So everybody knows that you've been tried and found guilty of assault, rape, murder, arson, poisoning and . . . lessee, now, there was somethin' else . . . uh, I ferget.

And that effectively cooks your goose.

The FDA can get a conviction on violating one of their own rulings—but under such conditions of publicity that the public misunderstanding will inevitably be that, at the trial, Krebiozen was proven a fraud!

When fanatics and bigots, with a deep and sincere conviction of truth-and-righteousness in their own decisions get into government, that sort of thing is almost automatic. They *know* they're right, and in all sincerity and honesty feel deeply the necessity of enforcing what they just *know* is right, even when they can't get all the evidence they would like. It's done with the highest motives, as they know, so they are aware that the opposition *must* be motivated by base motivations of some kind. Greed—lust for undeserved fame—something wicked must lie behind the determined effort to oppose their noble truth-and-righteousness.

In a trial like the Krebiozen business, newspapers don't make headlines of "Violation of FDA Ruling Trial"; it'll be called "Fraud Trial" or something more understandable.

That sort of thing leads to a situation in some ways like what the Dallas Police and District Attorney's office did to the Oswald case. If Ruby *hadn't* murdered Oswald . . . what sort of trial could Oswald have been given? Where in the state of Texas could you have found someone intelligent enough to be able to read and write who didn't have any opinions already

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formed from newspaper, TV and radio publicity? How would you assemble a legally qualified jury?

There's nothing like trial-by-publicity to give a bureaucracy the answers it wants. The vicious danger of that is that any such group—being made up of human beings—will very readily fall into believing that their own publicity has proven the truth-and-righteousness of what they believed in the first place. This is as neat a positive-feedback system as any electronic engineer ever rigged up!

The FDA attacked Krebiozen on the basis of some infra-red spectrograms that did not show the presence of anything not already known.

But the FDA has another pet hate—insecticide residues. The insecticide residues can be shown, by infrared spectroscopy, to be not-present, too. But that certainly doesn't fool the FDA for a moment—they know how insensitive the infrared spectroscope is when it comes to finding what they know is there. (It's exceedingly sensitive, however, for proving what they think *isn't* there, doesn't exist!) So the FDA researchers have worked with remarkable skill and perseverance in developing ultra-super-hyper-sensitive tests for finding insecticide residues. They've worked out one now that readily demonstrates the presence of one part in 10^{12} parts of water! Dilute one part in a million parts of water, then take one part of that and dilute that in another million parts of pure water, and they can readily demonstrate its presence!

This will involve a biological test, of course—certain varieties of plankton are extremely sensitive to the insecticide. So the FDA here, uses the biological tests for detecting the presence of their pet hate—the biological tests they refused absolutely to use for detecting whether Krebiozen contained anything other than things they were familiar with.

The FDA rulings, because of the

BASIC UPSETTER FOR PHYSICISTS

"Energy can't do anything" . . . *Dr. D. Wayne Batteau.*

Energy is equivalent to matter; both are conservative, and neither can be created nor dissipated, they can only be rearranged. Therefore, both are totally passive—they are *done to* but cannot *do.*

Therefore, energy *per se* cannot do work!

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laws which established the FDA, have the force of law—and they are completely arbitrary. Efforts to attack them in court are generally disastrous, because of the great skill they have developed in political work, and in trail-by-publicity. They have an immense advantage, politically and in publicity, because "doctor knows best" enshrouds them, and because they are a government agency, and everybody knows that the government always acts only for the good of the people, while those wicked, nasty, money-grabbing drug companies are out to make money at the expense of poor defenseless people.

My reason for attacking this setup? What do I have to gain?

Health for myself and my family, progress in medical research released from the stultifying, arbitrary and whimsical rulings of a self-righteous bureaucracy that believes its own publicity releases.

Remember that a tradition-oriented, conservative orthodoxy can base its judgments *only on the past.* It will inevitably view any and all new approaches to anything with acute skepticism and deep suspicion. It will not be strongly motivated by any painful or deadly deficiencies in its techniques, because they are traditionally "normal". People have committed suicide for untold ages; therefore, suicides by taking overdoses of lethal tranquilizers causes no alarm. People have died of cancer since before history began; therefore, medicine's inability to conquer the deadly menace isn't considered a deficiency—it's just the way (*sigh*) things are. Running live steam from a small portable boiler down into a Viet Cong warren to drive them out wouldn't be considered wicked; that sort of thing's been done for ages. But using a non-lehtal, not-really-toxic irritant chemical—oooooh! How *awful!*

There's a herbal substance used in Santo Domingo that has quite a reputation as an aphrodisiac. Seems the stuff has the ability to dissolve atherosclerotic deposits in the arteries, which tends to make a man feel considerably younger and more virile. This material cannot be imported into the United States—FDA ruling—because it's considered an aphrodisiac. The fact that it seems to be an effective treatment for atherosclerosis must not be allowed to influence judgment; aphrodisiacs are bad, wicked, and utterly forbidden.

That the desire to make profitable use of their skills and their equipment motivates the drug companies is obvious. But what—other than the highest humanitarian ideals—motivates the bureaucracy?

The staunch, impassioned defense of the Dear Old Reliable Status Quo. They know how to live and act in the world-as-it-is; who knows what painful revisions would be forced on the world by new ideas? The Editor.

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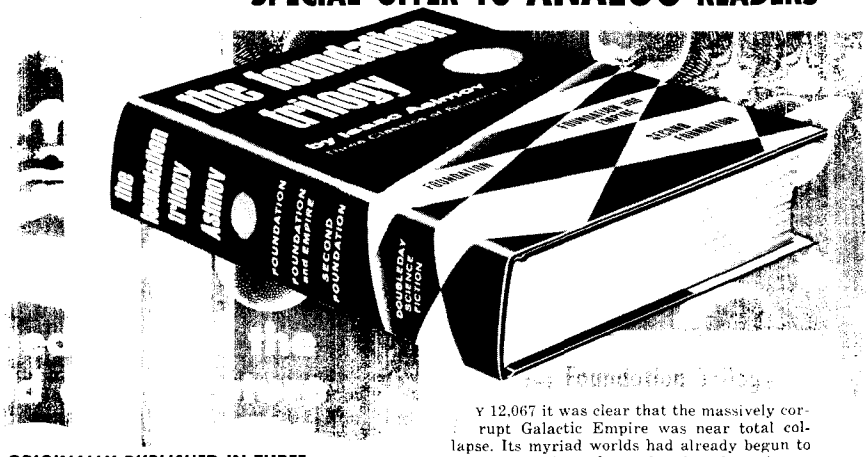

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